MINING WORLD

FEBRUARY, 1951

VOL. 13 No. 2

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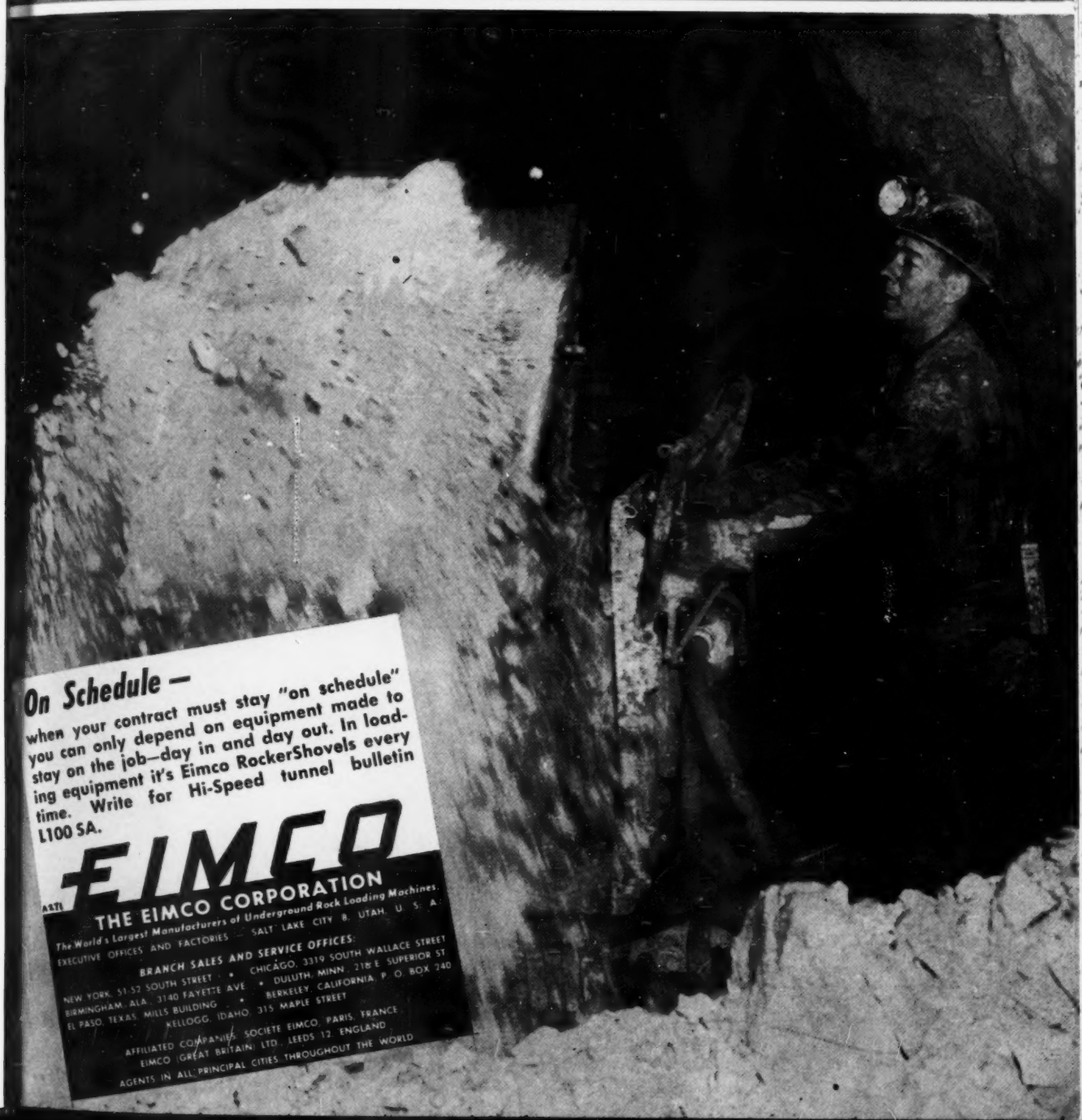

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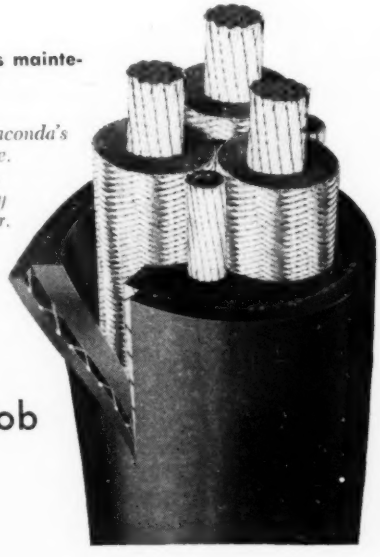

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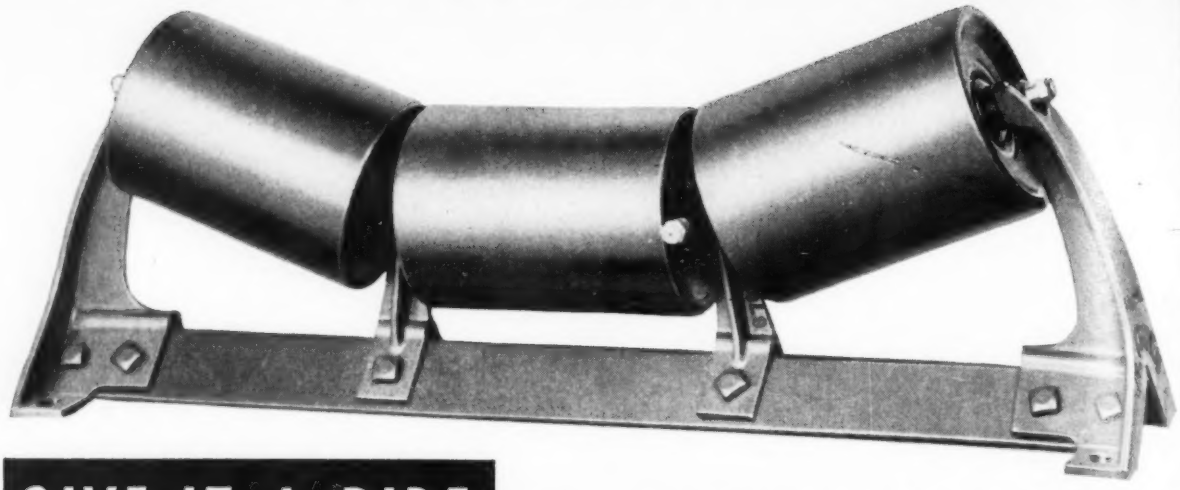

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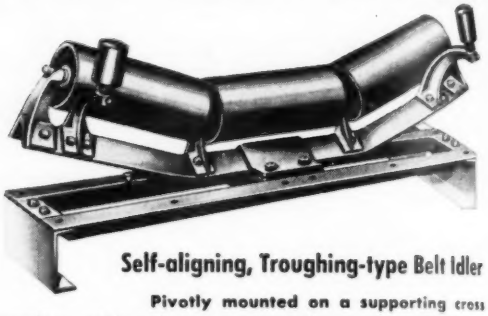

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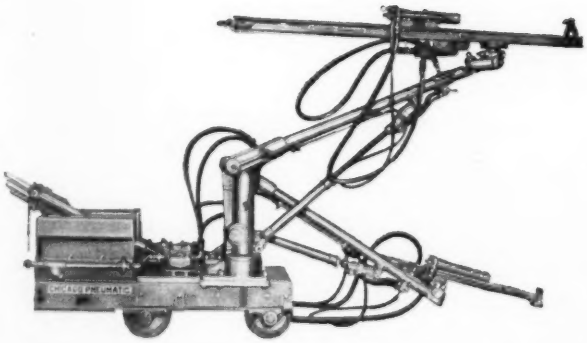
FOR HIGH-SPEED TUNNEL DRIVING

The new G-600 Air Actuated Drill Jumbo provides maximum speed and efficiency for tunnel driving. Rail-mounted, it is built for all standard track gauges, in single or multiple-boom units.

Outstanding Operating Features

- **Booms are quickly adjustable to any drilling position.**
- **Vertical adjustments are made by rotary air actuating motor.**
- **Automatic safety locks prevent boom arms from settling.**
- **Control valve of actuator motor is conveniently located at end of boom arm.**
- **Dual valve handles permit operation from either side of boom.**
- **Unit is readily disassembled and assembled. Component parts are of sizes easily handled on mine cages.**

For complete specifications write for copy of SP-3026



Twin-boom unit with two typical drill mountings for mine headings up to 10′ x 12′. Upper arm has 6-foot chain type feed mounting. Lower arm has 4-foot shell type feed mounting.

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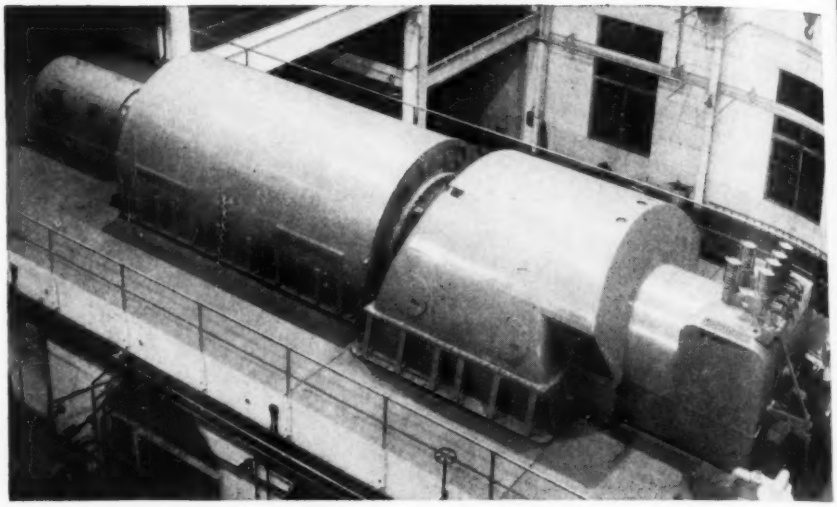
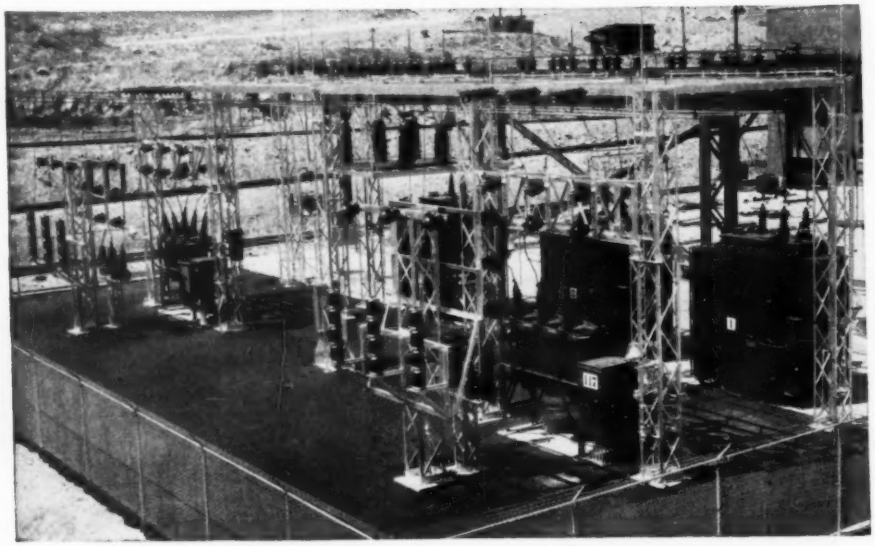
Powered for low-cost high-tonnage refining!

1 Typical of the mining industry's increasing electrification to handle high tonnages at low cost is this new copper refinery at Garfield, Utah, which has a capacity of 12,000 tons of refined copper per month, with provision for expansion to 16,000 tons. Power for the refinery and other operations comes from Kennecott's power station, where three G-E steam turbine-generators (two of 25,000 kw each, plus the 50,000-kw unit shown here) generate 13.8-kv power which is stepped up to 44 kv for transmission.



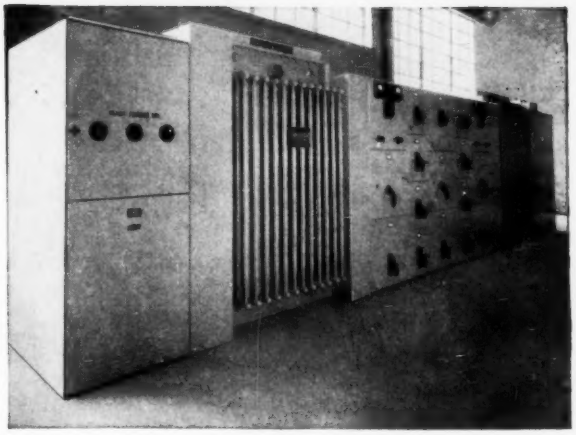


2 At the refinery, three miles away from the power plant, incoming 44-kv power is stepped down to 13.8 kv at this G-E package substation. Completely co-ordinated, it includes an outdoor steel switching structure, three 7500/9375-kva power transformers (with provision for addition of a fourth) and necessary metal-clad switchgear. G-E package substations, made in many standard combinations to fit all mining-industry needs, come in factory-built sections ready to install. They simplify ordering, save engineering time, speed installation, cut costs.

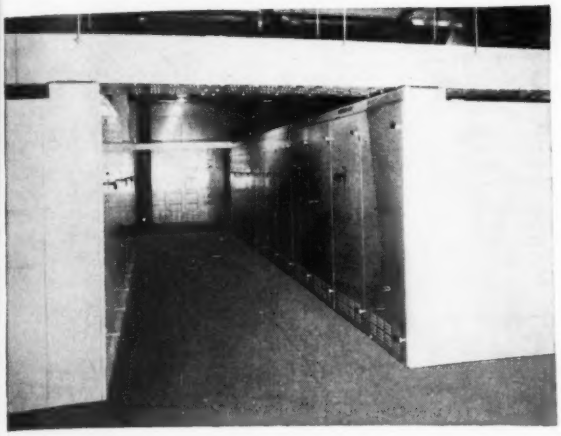
GENERAL ELECTRIC

660-20

In its new electrolytic refinery, Kennecott Copper Corporation uses this General Electric generation, conversion, and distribution equipment to help maintain production continuity

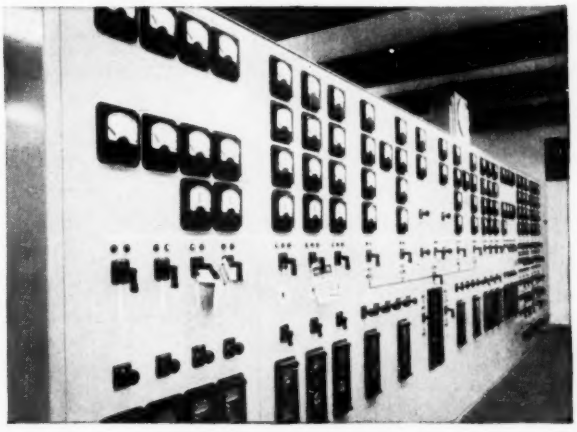


5 Four G-E 1500-kva double ended load-center substations (one shown) step down voltage from 13,800 to 480 and provide distribution at centers of load to reduce power losses.



3 Inside the refinery, protecting all 13.8-kv feeders and personnel as well, is this G-E metal-clad switchgear that provides flexibility for future load changes.

6 This G-E panel — controlling package substation, a-c switchgear, and d-c power for electrolytic cell lines — helps centralize and co-ordinate plant operations.



4 A-c is converted to d-c for electrolytic cell lines by six G-E motor-generator sets, each including a 2900-hp synchronous motor and two 1000-kw, 125-volt d-c generators.

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for the Mining Industry

Whatever your mining or processing problem, a good man to know is the mining industry specialist in your nearby G-E office. Ask him about power-system equipment for *your* plant to protect service continuity, help boost production, cut costs. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

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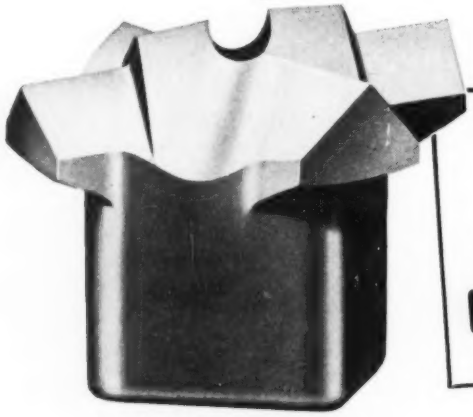

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DRIFTS AND CROSSCUTS

Attend Your Association's Mining Convention

This issue of MINING WORLD reaches you at a time when the nation's most important mining conventions are being held. A report on the Duluth meeting of the A.I.M.E. appears in this issue. The Colorado Mining Association's greatest convention has just been finished, and the New Mexico Miners and Prospectors Association and the annual meeting of the A.I.M.E. are scheduled for later in the month.

Record-breaking attendance at many of the conventions has been announced and the well-balanced, factual programs have been and will be the best in many years.

Several of the mining associations have had phenomenal growths in membership because of their hard-hitting, aggressive policies and the increasing recognition of what they do and can do for the industry.

The mining business, particularly for the small producer, has become more and more complex in all its phases from "getting rock in the box" to finding out and complying with all the federal and state regulations about taxes, labor, priorities and the many other hindrances to efficient mine operations. Added to these hindrances is the threat of growing government control and regulation. Your local association is one of the best sources of information on these problems.

Plan to attend the meeting of your association. Nowhere else can an operator get access to the combined knowledge of so many of the top industrial and governmental experts.

If you can't attend in person, the next best thing to do is to read MINING WORLD for a complete report.

That's Not What the Miner is Paid for Copper

The "Connecticut Valley" price for copper is 24.5 cents per pound. The miner, of course, receives much less for the copper content of his ore. If the western miner had need or reason recently to purchase a small dish, can or tray made of copper he received a terrific shock.

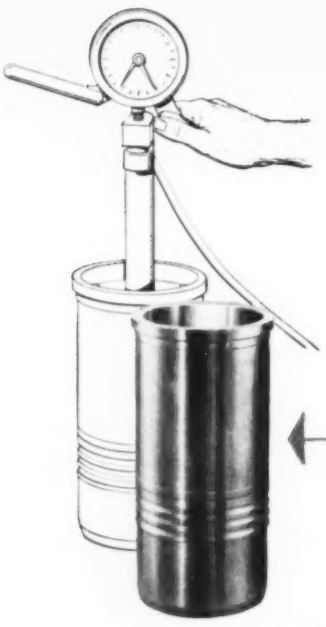
Typical costs for these items made by a simple stamping or drawing process are as follows: A copper plate weighing 1.25 pounds, $4.75; cost per pound of copper, $3.80. A copper dish weighing only 0.3 pound, $2.49; cost per pound of copper, $8.32. A copper water can weighing 0.4 pound, $3.75; a cost of $9.38.

The items were all stamped as made in one of such places as Yonkers, Hartford, or Brooklyn.

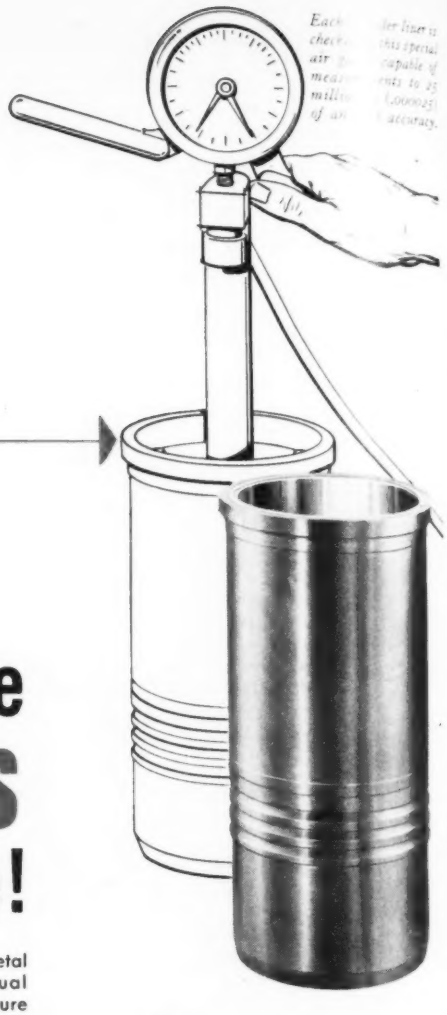
Small wonder that eastern fabricators have used many means to obtain copper except the most logical one: i.e. support of the domestic producer.

Engineers in Washington

Now Washington's planning, organization, administration and implementation of a minerals program are being revised almost daily. Some of the key mining figures responsible for this progress are Fred Searls, Jr., president of the Newmont Mining Corporation, who has been appointed assistant to Charles E. Wilson, Director, Office of Defense Mobilization. Searls will specialize in raw materials problems for ODM. During World War II he served as Director, Facilities Bureau, War Production Board, and was a member of the Planning Board to advise the WPB chairman on policies and



We take twice the care



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programs. Since 1948 he has been a consultant on stockpiling to the National Security Resources Board.

Despite the Administration's aversion to the use of industrialists (the dollar-a-year man of World War II) to aid in defense mobilization and production expansion, qualified men are going to Washington in increasing numbers.

This is particularly true in the minerals field—where they are needed most—and as a result a complete reversal of federal policies affecting mining seems evident. The reasons are clear. In contrast to manufacturing, which now has greater capacity than during World War II, mine production of many minerals has decreased.

Some of the mining engineers now in Washington aiding the bureaus and administrations to meet increasing demands for metals have long pointed out, to no avail, the adverse governmental policies toward domestic mining.

S. H. Williston
From Aluminum to Zinc

Otto Herres
Lead-Zinc-Cadmium

Sam H. Williston of Los Altos, California was one of the first mining men to be called to Washington. He is vice president and treasurer of the Cordero Mining Company, vice president of the Oregon Mining Association, and vice president and director of the Sperry-Sun Well Surveying Company. In Washington he has served as acting director of the Supply Division of the Defense Minerals Administration and alternate chairman for the Operating Committee of DMA.

Otto Herres, vice president of the Combined Metals Reduction Company, Salt Lake City, Utah, is acting chief of the lead-zinc division of DMA (which also includes cadmium-bismuth-indium-germanium, etc.). He graduated from the Colorado School of Mines in 1911 and has been engaged continuously since that time in coal and metal mining. During World War II he was in charge of the MacIntyre titanium-iron development of the Titanium Division of National Lead Company at Tahawus, New York. He has supervised the development and operation of mines under emergency conditions during two World Wars and is recognized as one of the industry's soundest thinkers.

James K. Richardson
Copper-Molybdenum

P. R. Bradley, Jr.
Tungsten-Chrome-Manganese

James K. Richardson, industrial engineer, Western Operating Division, Kennecott Copper Corporation, of Salt Lake City, Utah, is acting chief of the copper-molybdenum division. He has worked for the Phelps Dodge Corporation, Anaconda Copper Mining Company and Miami Copper Company. In 1936 he became director of safety and hygiene for Climax Molybdenum Company and resigned in 1942 to become secretary of the Tri-State Zinc and Lead Ore Producers Association. In 1946 he was appointed manager of the Utah Mining Association.

Philip R. Bradley, Jr., president of the Pacific Mining Company, Harvard Gold Mining Company, development subsidiaries of the Alaska Juneau Gold Mining Company, and Mother Lode Mining Association, has been appointed acting chief of DMA's tungsten-chrome-manganese division. His home is in Berkeley, California, but he has had 25 years of engineering and management of mines in Ontario, Canada, Bolivia, Nevada, Oregon and California.

National Security and Mineral Statistics

A recent report from Washington states that the President has ordered the Budget Bureau to maintain close surveillance on federal publication of statistics and to restrict publication of them "whenever, in any instance, release of the information might endanger the national security."

This plan to restrict statistical information is one about which the American public is entitled to know more. What types of information will be withheld? What is the definition of "national security"?

Certainly the public in general and the mineral producers in particular know the desirability and necessity of withholding production statistics on uranium, uranium-vanadium, vanadium and lead-vanadate ores. The tonnage of metals in the stockpile should also be withheld.

During World War II most mine production statistics as compiled by the U. S. Bureau of Mines were given limited distribution and were classified and marked "confidential."

Supression and censorship of mineral production statistics, except those outlined above, would serve no useful purpose at this time nor would they make data unavailable. Russian engineers have visited many of the nation's largest mines and processing plants and know their production and reserves.

The Russian Embassy funnels data more valuable than mine output figures to the Kremlin. Figures for armament output, not for tons of zinc mined, should be withheld.

Americans have reason to be proud of their production. Let the Russian people know what Americans produce; don't withhold information from the American people that is well known to the Russian government.

G. O. A., Jr.

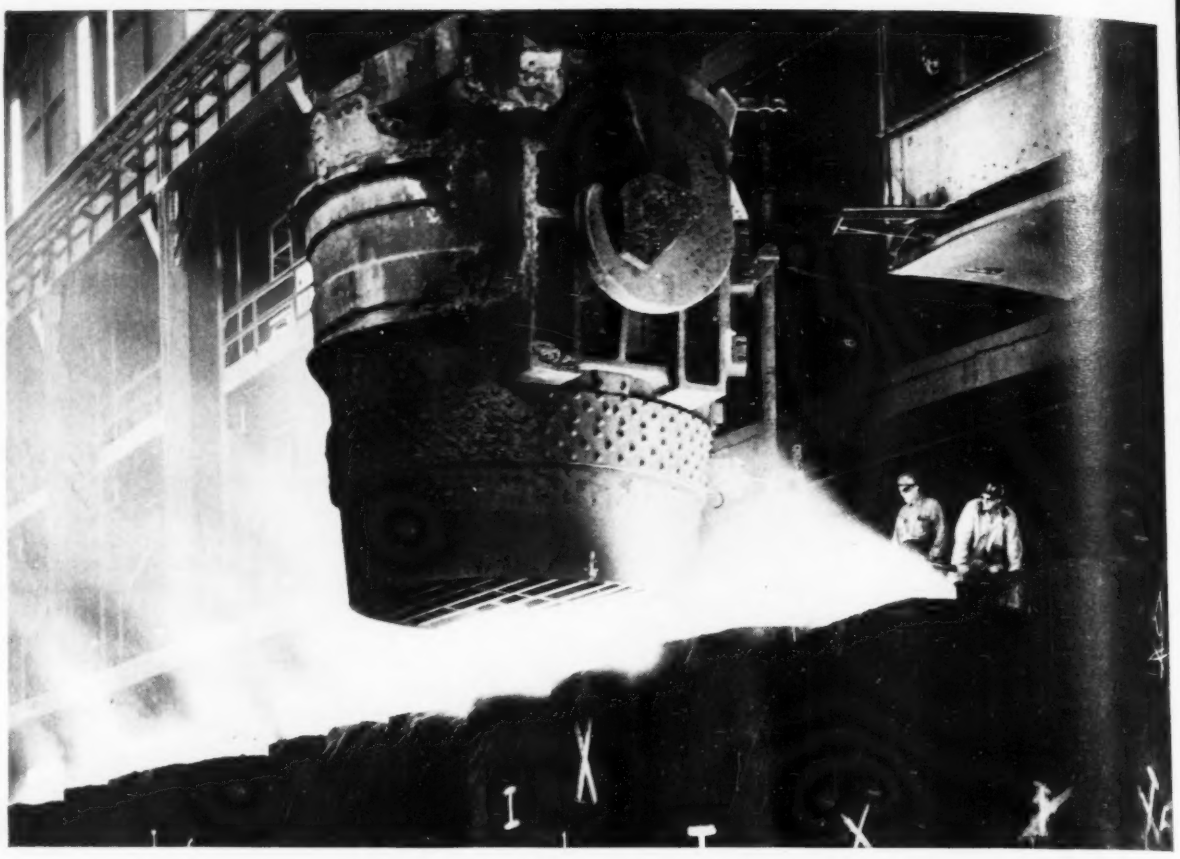
COMING CONVENTIONS

February 15, 16 and 17, 1951. NEW MEXICO MINERS AND PROSPECTORS ASSOCIATION, Hilton Hotel, Albuquerque, New Mexico.

February 15, 1951. Annual Meeting MINERAL INDUSTRY INSTITUTE, sponsored by the School of Mineral Engineering, University of Washington, University of Washington Campus, Seattle, Wash.

February 18 to 22, 1951. Annual Meeting AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, Jefferson Hotel, St. Louis, Missouri.

March 19 through 23, 1951. METAL CONGRESS & EXPOSITION, Oakland Civic Auditorium, Oakland, California.



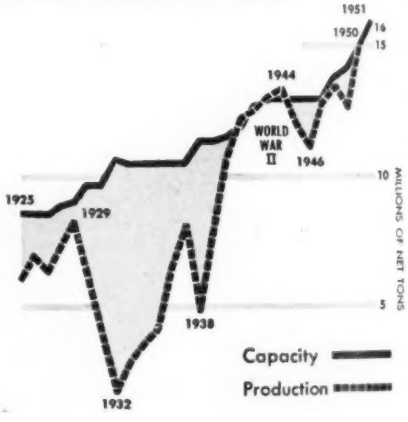
MILLION TONS MORE STEEL

Latest Increase in Bethlehem's Annual Capacity Climaxes 5 Years of Postwar 3,100,000-Ton Expansion

On January 1 of this year Bethlehem's steel making capacity stood at 16 million ingot-tons annually—*an increase of 1 million tons* over a year ago.

Since the war ended we have increased our annual steelmaking capacity *3,100,000 tons, or 24 per cent.*

Moreover, as the chart at the right shows, Bethlehem's steel capacity has nearly doubled in 25 years. Additional capacity can and will be created as it is needed.



BETHLEHEM STEEL ★ BETHLEHEM STEEL ★

CAPITOL CONCENTRATES

CONFUSION CREATED BY NOT USING PROVEN METHODS OF WORLD WAR II

The critical shortage of metals and minerals is causing great concern in England. About the same items that are in short supply here are in short supply there. Apparently then, we should, as far as possible, turn to sources of domestic supply at almost any cost; obviously, there is not enough to be had abroad.

It is high time some one informed Steelman and Symington concerning the Administration's policies which have stood and still are standing in the way of all-out mineral production in the United States. Not the least of these has been the President's attitude on the buy-American act and his extraordinary reluctance to put into effect a premium or bonus system which will bring out marginal ores without disturbing the market.

The experiences of World War II should be remembered and utilized. The methods used at that time were thoroughly explored and found effective. Why the NSRB and the Interior Department have insisted on taking completely new and untried routes is a mystery. The new procedures have created chaos and produced few results. Let's get back to a little common sense.

Senator McCarran Reports on DPA

In a recent speech on the floor of the United States Senate the Honorable Senator Pat McCarran said the following about the DPA, DMA and application forms for loans.

"I believe I can say without successful contradiction that it was the intent of Congress through the DPA act to secure minerals and metals as speedily as possible to build up our depleted reserves. I believe it was the further intent of Congress that the administering agencies designated should have the same thought in mind. However, the Congress did not reckon with the red-tape experts in its timetable of implementing national security.

"A mining company would be eligible to secure a loan application only if its metal or mineral were on the essential list. Strangely enough, this questionnaire asks the applicant to set forth the existent shortages of the metal or mineral, either regionally or nationally, presumably, the true shortage of a metal such as copper, lead, or zinc, is top-secret information known only to the munitions board, the joint chiefs of staff, and the National Security Resources Board itself.

"The form asks the miner to go one step further and do a 'crystal gazing act' by predicting to the National Security Resources Board what the future shortage of the metal or mineral might be. Again, such predictions can come only from the munitions board, the Joint Chiefs of Staff, and the National Security Resources Board.

"Meanwhile, the mining men of the West, who are asking for a chance to dig out minerals vital to any war effort, are plagued with this comedy of errors.

"This Nation must have minerals and metals—not on paper application forms, but in fighting equipment in the hands of our soldiers, sailors, and airmen."

Policy Statement Made By Boyd

The address which Dr. James Boyd, deputy administrator of the Defense Minerals Administration, made on December 5, 1950, should be carefully studied by mining people who expect to apply for government aid of one type or another. Boyd's speech set forth the Interior Department's policy within the regulations of the National Security Board.

A few high spots may be emphasized here: "Commitments for assistance in developing and mining mineral deposits will be made only when the necessary processing plants, water supply, and access roads exist . . . the technical and managerial competence of the operator will also be considered . . . financial assistance is not otherwise available on reasonable terms . . . most project proposals will require a field examination . . . projects must show definite promise of yielding materials of acceptable grade, physical character and specifications, in amounts that will significantly improve the mineral supply position for the national defense."

In the case of applicants for purchase contracts, the applicant "will be required to demonstrate to the satisfaction of the Defense Minerals Administration that ore reserves of suitable grade and character are available and adequate . . . (to) meet a firm delivery schedule."

Duty Increase Will Help Lead Producers

To read of a trend away from the general flow of the tide is always rather refreshing.

Some time ago the abrogation of the Mexican Treaty was reported, and now one of the results will be seen, for on January 1, 1951, the lead tariff doubled to 1.5 cents per pound on lead contained in ores. On imported, refined lead it jumped to 2.125 cents per pound . . . not enough to give real protection to domestic industry in normal times, but a help.

Industrial Expansion Exceeds Power Supply

Industry has expanded much faster than the electric power supply of the country. After World War II there was a surplus of power in some areas as the huge defense plants shut down. Before long the growth of industry took up this slack and the power supply was reapportioned. Now that many of the plants are to be reactivated, government officials dealing with power supply and allocation are at their wits end to find enough power.

The Secretary of the Interior now is asking that the electric power industry, federal and private, be granted a blanket exception to the copper cut-back order.

The Secretary would be smart to see to it that small and marginal copper mines had every encouragement to reopen, expand and produce as much as possible. Maybe percentage-wise the copper from the smaller mines does not amount to much, but even a 10 percent increase would relieve the situation a good deal.

Anti-Hoarding Order Issued

The new anti-hoarding order of the National Production Authority (NPA Notice 1) will apply fines of up to $10,000 or a year in jail to anyone who stores more than he requires or speculates in iron or steel products, scrap aluminum, antimony, cadmium, cerium, chromium, cobalt, columbium, copper, industrial diamonds, lead, magnesium, mica, molybdenum, nickel, platinum, talc, tin, tungsten, vanadium, zinc, and zirconium. The determination of what may be reasonable amounts to have on hand in a given set of circumstances may be very difficult.

By Walter Hovey Hill
Consulting Engineer
Grangeville, Idaho

RARE EARTH, INC., REDREDGES IDAHO GOLD PLACER FOR MONAZITE

Monazite, the chief source of thorium oxide, is also rich in other "rare earths." Basically a phosphate of cerium, lanthanum, and dysprosium with a thorium oxide content up to 20 percent, monazite also contains yttrium, samarium, neodymium, gadolinium, praseodymium, erbium, europium, and ytterbium.

In the early 1900's the thorium content of monazite was extracted and used in the manufacture of mantles for gas lamps. Later on, the cerium content became an important factor in making lighter flints. The recent demand for monazite is for its radioactive elements for use in the atomic-energy developments and for the rare-earth constituents which chemists have found increasingly useful in many fields of industry.

During the past five years methods for recovering monazite by dredging have been worked out by two companies operating in Idaho. However, as a preamble to the discussion of their work, a brief historical sketch follows on placer mining at Warren, Idaho County, Idaho, leading eventually to monazite recovery operations.

Placer Gold Operations

Gold was first discovered in the county by James Warren and others in August, 1862. The camp had a great influx of gold seekers from other gold rush camps and, as the Civil War was on, the camp was divided and called Richmond and Washington, and finally named Warren after the first discoverer.

The bulk of gold production came from rich streams and hillside placers. Within 35 years of the district's discovery, Waldemar Lindgren[1], who had first visited the district in 1897, said that production "certainly must exceed $15,000,000."

Although hundreds of Chinese had been working by hand on about 60 acres of the broad valley, shoveling the gravel up in stages onto platforms and then into sluice boxes, there was no attempt to dredge the rich gravels in the thousands of acres in the basin until May, 1897. At that time the first attempt to operate a dredge in the valley was made by the Warren Placer Mining Company, an Idaho corporation, backed by Philadelphia capital. A wood-fired, three-yard steam shovel was hauled in and set up. The gravel was dumped into large dump cars on a track and hauled to the foot of an incline by one mule. The cars were hoisted to a tipple by a steam-driven hoist and the gravel was dumped into the head box leading to a sluice line. Water for sluicing was brought from Steamboat Creek by ditch and trestle. Although the gravel in this area was supposed to run 50 cents per yard this enterprise did not succeed.

In 1902, Collin McIntosh, a civil engineer, moved into the camp with a large outfit of horses, slips, and wheel scrapers, but he couldn't make his venture pay. In 1907 James Reardon, who had patented a large part of the meadows for J. B. Chamberlain and Ed Brooks, the early locaters, brought in and operated a small Risdon dredge, which also did not pay. After Reardon the Alexander family of British Columbia acquired all the patented ground, the South, Middle, North and Canyon Placers, U. S. Mineral Survey No. 1255. However, not until the property was optioned by E. T. Fisher, who in 1931 installed a four-foot bucket-line dredge on a wooden hull with steam for power, was there any profit made dredging Warren Meadows. Fisher and A. F. Baumhoff organized the Idaho Gold Dredging Company to dredge the property.

This company was succeeded by the Warren Dredging Company, a co-partnership which later moved out of the camp and sold the ground and the dredge to W. W. Prather and Brad Carrey.

Shortly thereafter another company, the Warren Creek Dredging Company, headed by Andy Anderson, Joe Ferris and John Marchbank, brought in another four-foot dredge

1—Lindgren, Waldemar, *The Gold and Silver Veins of Silver City, DeLamar and Other Mining Districts in Idaho*: U. S. Geological Survey 20th Annual Report, part 3, pp. 237-249, 1900

This Yuba dredge, operated by the Rare Earths, Inc., was moved from Centerville to Warren, Idaho, and, when pictured in October, 1950, was almost ready to start digging on the Canyon Placer.

from Colorado and worked the ground above the Fisher and Baumhoff operations up to Warren and up Steamboat Creek, making a large profit. When the company had redredged back down Steamboat, the dredge was sold to Fisher, Baumhoff and McDowell, who worked some bench ground on the west side of Warren Creek at a profit. (This dredge later was moved out of the district.)

About 1934, a two-foot, Yuba-built, bucket-line dredge, electrically equipped, was brought into the camp and worked on the shallower portions of Warren Creek near and above the town and subsequently was moved to Centerville.

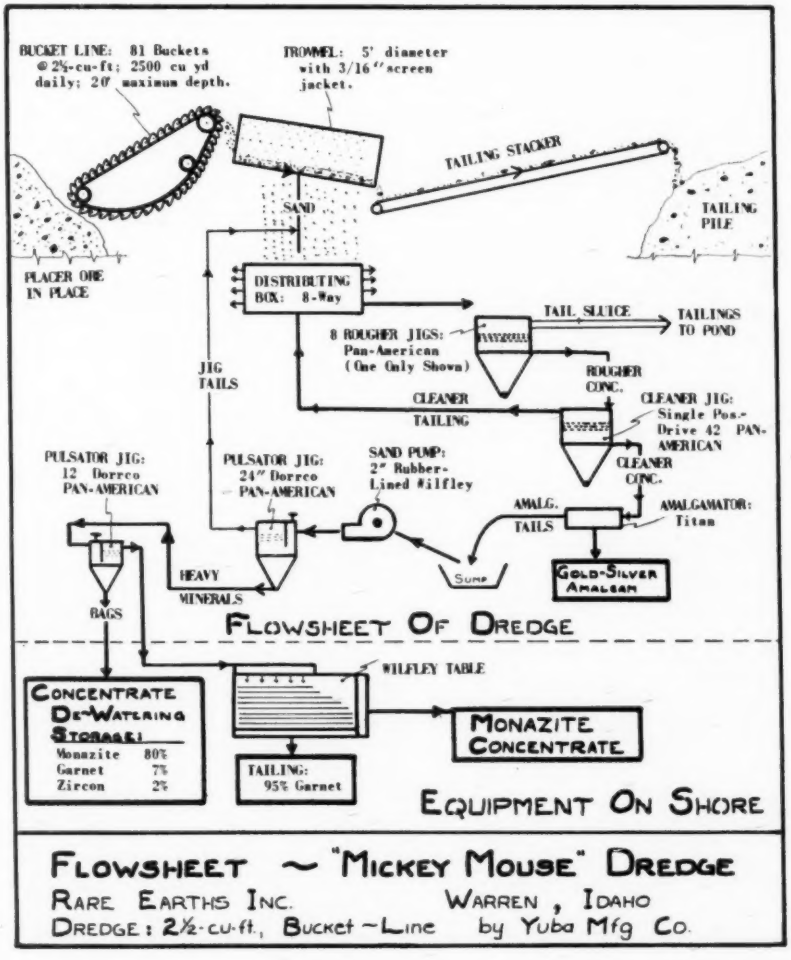
Interest in Monazite

Several years ago the fact became evident that our national supply of monazite was about to be cut off at its source, i.e., Brazil and India, and a search was started for a domestic supply. Since the early 1900's small amounts of monazite had been taken from the placer deposits in South Carolina and from the beach sands in Florida. The meager possibilities at these sources led geologists to other areas—especially those areas of the western part of the United States adjacent to granite batholiths. The existence of monazite and uranium minerals in the heavy alluvial sands in Idaho's Warren Valley and on some of the hillside gold placers had been known for many years; the early miners had considered a nuisance the heavy yellow sand that looked like gold and clogged the riffles in their sluice boxes. In 1938 V. C. Reed[2] had reported: "A single dredge in the Warren district could possibly produce in a few days as much monazite as was used in the United States in 1935." Reed said he determined facts for the statement from the amount of monazite in a 100-pound sample which had been taken from the riffles on the Fisher-Baumhoff dredge which was then recovering gold in about the middle of the valley just below an island of timber where the Chinese had worked 30 years previously.

Rare Earths, Inc.—Pioneers

About five years ago the attention of Rare Earths, Inc., pioneers in the industry whose name it bears, was drawn to central Idaho as a result of the search for a source of monazite in the United States. This company and Baumhoff and Marshall, Inc., are at present the two established concerns in Valley and Idaho counties of Idaho, recovering monazite in quantities sufficient to supply the ever-growing demand.

The owners of Rare Earths, Leland Waggoner, an oil operator from Illinois, and B. Munson Waggoner, geologist, have spent much time and capital in exploration, study and sampling in the area. Mrs. Waggoner has had published a 22-page report on their findings and it is on file with the United States Geological Survey, Washington, D. C.



[2]—Reed, V. C., *Geology and Ore Deposits of the Warren Mining District, Idaho County, Idaho*: Idaho Bureau of of Mines and Geology, Pamphlet 45, pp. 31-35, 1938.

LEFT: Test drilling placer gold tailing for monazite sands during 1949. RIGHT: Downstream view of Warren Meadows from Bed Rock point. All the dredge tailing contains some gold and monazite-bearing sand.

"Mickey Mouse" Dredge

Rare Earths, Inc., now has its dredge, locally known as "Mickey Mouse," near Warren on the Canyon Placer, the most northerly claim of the group. The dredge is working up stream in shallow ground and recovering gold that the former dredges lost, monazite, garnet and zircon. This dredge is Yuba-built, has 81 buckets, is driven by a 340 hp. diesel-electric engine and has a rated capacity of 2,500 cubic yards per day, digging 20 feet below the water line.

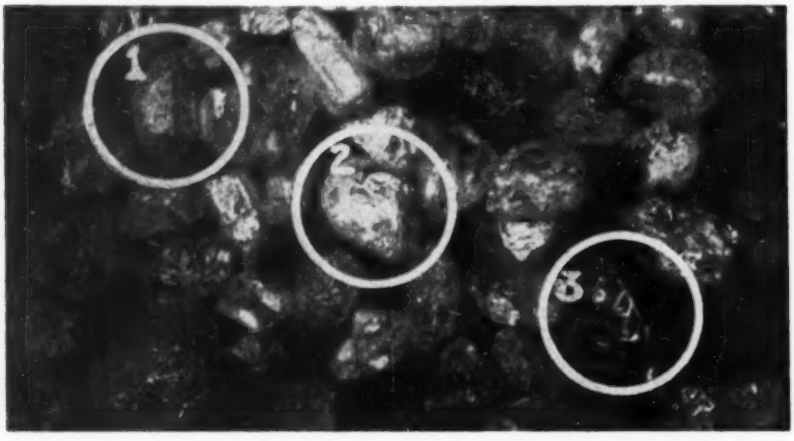
The concentrate in the Warren area contains approximately 45 percent monazite, 50 percent garnet, and 2 percent zircon. Concentrate recovery averages about 10 pounds per yard of gravel.

The flow sheet on the dredge is comparatively simple. From the bucket the gravel drops into a five-foot trommel, surrounded by a 3/16-inch screen jacket. The distributor box below the trommel screen channels the sand to a battery of eight Pan-American rougher jigs, where most of the quartz and other low gravity minerals are discarded.

The concentrate from these rougher jigs goes into at single positive-drive, 42-inch, Pan-American jig and then into a Titan amalgamator where the gold is recovered. The gold-free concentrate drops to a sump and then is pumped by a two-inch, rubber-lined, Wilfley sand pump into a 24-inch, Dorrco, Pan-American pulsator jig for final concentration. Tailing from the 24-inch, Dorrco, Pan-American jig is returned to the distributor box for retreatment in the closed circuit.

The process eliminates any losses which might occur at the 24-inch pulsator jig. The concentrates from the 12-inch jig contain approximately 80 percent monazite, 7 percent garnet and 2 percent zircon. This wet concentrate is bagged in cotton bags similar to cement bags and hauled to storage for dewatering (in the bags) before shipping.

Enlarged photograph of the concentrate produced by Rare Earths, Inc., shows (1), a typical monazite crystal, (2), a garnet crystal, and (3), a zircon crystal.



Tailing from the 12-inch jig contains about 15 percent monazite, 80 percent garnet and 2 percent zircon. The tailing will be run over Wilfley concentration tables at Warren to recover the monazite. Table tailing is about 95 percent garnet and will be sold as an abrasive.

The ground to be dredged in Warren is largely old tailing that was dredged for gold in the 1930's and 1940's. There are around 40,000,000 cubic yards of dredgeable gravel from 10 to 35 feet in depth in the Warren Valley. A larger dredge to dig deeper parts of this extensive deposit is planned in the future.

Baumhoff and Marshall

Baumhoff and Marshall have built a six cubic foot bucket-line dredge at Big Creek, three miles south of Cascade, Idaho. The concentrate from this location contains approximately 10 percent monazite and 90 percent ilmenite. Production is around 50 tons of concentrate per day, which is trucked to a separation plant at Boise.

The Baumhoff-Marshall flow sheet is essentially the same as Rare Earths', except for the gold amalgamator, which is omitted up to the last step of concentration. The large amount of ilmenite in the Big Creek concentrates necessitates a magnetic separation to segregate the monazite. The separation is done with Ding's and Carpo separators at the Baumhoff-Marshall plant at Boise.

When scientists of the Atomic Energy Commission have perfected methods to use thorium as an atomic fuel, the placer deposits of central Idaho can and will furnish an immediate and dependable supply of thorium-bearing monazite.

The 175 tons of ore per day mined below the 3500 level is hauled 2,500 feet to the Central Eureka shaft by this storage battery locomotive. Ore is hoisted through the shaft to the gravity-flotation-cyanide mill.

CENTRAL EUREKA CUTS MINING COSTS

Footwall drifts, sand filled stopes and a rapid mining cycle mean lower costs despite a badly broken hanging wall in this narrow-vein gold mine

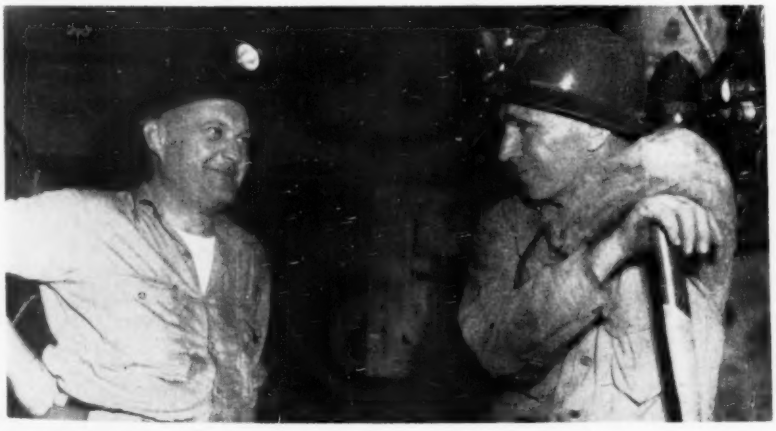
The Central Eureka Mining Company operating the Central and Old Eureka mines at Sutter Creek, Amador County, California, is the largest Mother Lode gold producer in this one-hundredth year of lode gold mining in California.

The distinction is due, in part, to the efficiency of the company's operation under the direction of J. D. Swift, president; Donald D. Smith, secretary-treasurer; and Arthur E. Kendall, general manager.

The World War II gold mine closing order, I-208, and high post war costs for labor and supplies have closed and kept closed most of California's Mother Lode mines. Tragically, some perhaps never will be reopened. Central Eureka is the notable exception and is now producing more ore per man shift and at a lower cost per ounce of gold recovered than in the immediate pre war years. All the more remarkable is this achievement in the light of worsening underground conditions over which the company has no control. These are greater water inflow from the nearby inoperative Argonaut and Kennedy mines, increasing hoisting costs as the mining area deepens, and the location of the large Wolverine fault in relation to the vein.

In the higher levels the ore was mined from a steeply dipping (75 to 80 degree) quartz vein of a type found in a strong shear zone. The vein being worked at present is in a fault zone and has the Wolverine fault as a hanging wall.

Donald D. Smith, left, secretary-treasurer, and Arthur E. Kendall, general manager, discuss operating problems during an underground inspection trip. Smith's cost accounting and purchasing system combined with Kendall's mining know-how have resulted in up-to-the-minute data on costs for each ounce of gold produced.



Serious Mining Problem

Level development above the 3900 level had generally been in the vein with the stopes carried directly from the drift. With a broken and heavy hanging wall the cost of maintaining the haulage level became prohibitive and a repair crew was kept busy replacing timber. As a means of eliminating this cost the haulage drifts on the 3900 level, the most recent development, have been driven in the solid greenstone footwall. From the drifts short crosscuts are driven across the vein at 150 foot intervals. Interesting to note is that the sand filling system introduced at Central Eureka by William C. Plumb, former general manager, has been so satisfactory that all waste from footwall development is hoisted twice and trammed twice to get it to the surface for disposal.

A three compartment raise is driven on the vein from each crosscut. The raises are 20 feet high with a small pocket and chute on each end. After the chutes have been built, eight foot high intermediate drifts are driven each way on the vein for 80 to 100 feet (economical slushing distance). One air, or electrically-driven, double drum slusher set up at the raise is used to slush out both drifts.

LEFT: North face of the 3900 foot level stope. The beautifully banded quartz vein and the black slate hanging wall make a striking color contrast. The timber bulkhead will separate the sand filling from the vein to be mined by a later cut. RIGHT: Approximately one half of production at Central Eureka is hoisted through the winze extending from the 3500 to 3900 foot level. Ray Tripp is the winze hoistman. About one-half of the ore is mined from stopes above the 3500 foot level and slushed into a transfer raise and dropped to the 3500 foot level. Stoping is in progress on the 3400, 3100, 3000 and 2900 foot levels. Stoping of excellent grade ore on the 2900 foot level was started about December 1, 1950.

The drifts are timbered with post and cap sets (post butting against hanging wall end of cap) and the hanging wall and back lagged. Hitches for the posts are cut in the bottom of the drift and headboards or hitches used for the footwall end of the cap. The two piece sets are unframed native timber sawed on two sides only. Collar braces and two inch pieces of lagging spiked to the post hold the cap in place. Ground conditions determine the number and spacing of the sets—usually on five foot centers— and the amount of lagging and blocking required. By this system cheaper timber and lower framing and placement costs have greatly reduced total timbering costs in comparison to costs obtained when using squared and framed sets.

Horizontal Cut and Sand Fill

An eight foot high horizontal cut is next taken along the full length of the drift. In making the cut, flat holes, well away from the hanging wall, are drilled with a lightweight Atlas Diesel jackleg-mounted drill using Coromant tungsten-carbide-tipped drill steel. The combination has cut both drilling time and cost. As the vein is blasted, two piece sets are placed directly above the drift sets.

When the cut has been completed, each end of the stope is bulkheaded with lagging and all cracks and holes in the bulkhead are packed tightly with excelsior to make a sand tight barrier through which water will drain. The excelsior has the same coefficient of expansion as the lagging, when subjected to water, and has proved better than rags or water proof paper for making a tight bulkhead. The stope is then filled to within eight feet of the back with mill sand tailing having a 60 to 65 percent density. One pound of $Al_2(SO_4)_3$ has been added to each ton of tailing. The $Al_2(SO_4)_3$ is a settling agent and has proved so effective that ore has been blasted on top of the fill by the shift following the shift which placed the fill. Tailing from mill to stope must travel what is apparently a record distance of about 6,000 feet through a two-inch pipe line. Of that total, some 4,000 feet is vertically down the Central Eureka shaft and Old Eureka winze and 1,500 feet is horizontal through the 3,000 level drift. Telephonic communication between the mill and underground fill crews has been a big factor in preventing sanding of the fill line. When fill is needed underground the mill is called and about eight minutes later the sand reaches the stope. Careful water flushing of the fill line after shutting off the flow of sand tailing is absolutely necessary.

The lightweight Sandvik drill with "Coromant" steel has been used in Central Eureka stopes since late 1950. Its use has contributed to increased tonnage per man shift. The first 12 pieces of steel drilled an average of 416 feet of hole.

The fast cycle of mining and sand filling means that only a small area of hanging wall is ever exposed at one time. Only the minimum necessary timber is used and every cut is mined so rapidly that it is seldom necessary to replace any broken timber. The sand fill forms a solid non-compressible mass extending into every crevice.

The system has resulted in greater tonnage per man shift, minimum timber consumption, small dilution, low cost fill, and reduced drilling cost, collectively resulting in a smaller cost per ounce of gold recovered.

The data in Table No. 1 show how effective this mining system is and how Central Eureka remains in the gold mining business.

TABLE NO. 1

TYPICAL MONTHLY MINING COSTS AT SUTTER CREEK MINE OF THE CENTRAL EUREKA MINING COMPANY FOR PRE- AND POST-WORLD WAR II PERIODS

Month and Year	*Tons Mined per Month*	*Number of Men on Mine Payroll*	*Tons Per Man Shift*	*Board Feet Timber Used*	*Bd. Ft. Timber Per Ton Mined*	*Mining Cost Per Ton*
Pre-World War II*	4,285	119	1.24	160,000	40	$11.54
Early 1949	3,700	82	1.72	41,200	11	18.24
Early 1950	3,280	71	1.75	43,000	13	14.36
Late 1950**	3,000	54	2.12	31,000	10	12.26

*2,500 tons waste were broken during this period. Tons of waste plus ore per man shift was 1.96.
**Some underground men lost to war industries but most of miners remained on job. Use of new light weight drills in stoping increased efficiency during this period.

John D. Mitchell Tells of

LOST MINES AND BURIED TREASURES

THE LOST JACK RABBIT MINE

Still living on the Sacaton Reservation are several old Pima Indians who, in their younger days, served as guides for a party of bear hunters from the East. When the eastern nimrods had been settled comfortably in their camp in the wild Mount Ord country, about 50 miles northeast of Phoenix, Arizona, the Pimas started back to the reservation. In order to shorten the distance as much as possible, they traveled in a straight line from Mount Ord to the Superstitions.

The young bucks were in a merry mood and traveled fast—single file, Indian style. When passing through the high rocky ground a few miles north of the Superstitions, they came upon the skeletons of what appeared to be two white men. The bones had bleached white from their long exposure to the desert sun and lay scattered over a considerable area, evidently having been preyed upon by coyotes and carrion birds. Nearby were a number of old-time brass shells of a large calibre, such as were used in guns of that early period in the West. A few rusted cooking utensils and other camp equipment were found near a shallow mine shaft. At one side of the shallow working was a small pile of ore containing metal that sparkled in the desert sun. Thinking the rock might be of some use to members of the tribe in their limited art work, they each carried a few pieces of it along with them.

Late in the afternoon, while skirting the western base of the Superstitions, they sighted a large number of jack rabbits. Guns and ammunition were very scarce among the Pimas in those days and they were in the habit of running down much of the small game they used for food. To tire the rabbits out, until they could no longer run, the Indians used a relay system. One would run until he was near exhaustion, then a fresh man took up the chase, never allowing the jacks to slacken their speed for more than a minute or two.

The young bucks were successful in bagging several of the big jacks and again headed for the Sacaton Reservation. Shortly before sunset they arrived at the ancient water hole between Queen Creek and the north end of the Santan Mountains, where they stopped to quench their thirst and rest for the night. During the evening an old prospector came to the water hole to fill his water kegs and his attention was attracted to the little pile of ore the Pimas had thrown on the ground. He picked up a few pieces of the white quartz and was surprised to see that it contained a large amount of free gold. Not wishing to unduly excite the young Indians, he tossed the samples aside, told them the ore was no good and to throw it away. The next morning he returned to the water hole after the Indians were gone and was delighted to see that several pieces of the rich ore had been left behind.

The old fellow gathered up the pieces of quartz and quickly returned to his camp in the foothills. Immediately he saddled one of his burros and set out to trail or backtrack the Pimas to the place where they had found the shallow shaft and the skeletons. Everything went along nicely and the trail was well defined and easy to follow—that is, up to the place where the Indians had jumped the jack rabbits. There the tracks were scattered all over the desert.

Finding it impossible to pick up the trail in the sandy ground along the west side of the Superstitions, he "cut for signs" by riding in a circle. Finally he picked up the trail again and followed it into the high rocky ground north of the Superstitions, where it disappeared in the rocks. By that time it had grown late and he returned to his camp to think things over and plan for another trip.

Anxious to know how high in gold the ore would run, he took some pieces to Phoenix, where it was assayed by Joe Porterea, and old-timer well and favorably known to many mining men of the state. The certificate showed that the ore ran $35,000 in gold to the ton and gave every evidence of having come from the country between the Superstitions and Mount Ord.

The prospector returned to camp and in the years that followed made frequent trips into the north country searching for the shallow shaft and the pile of rich gold quarts. With the passage of time the old man was forced to tell his secret to others in order to get a grubstake to enable him to keep up the search.

Continued on Page 82

Everything went along nicely and the trail was well defined and easy to follow—that is, up to the place where the Indians had jumped the jack rabbits.

ACTIVITIES OF U. S. MINING MEN

O. W. BILHARZ was re-elected president of the Tri-State Zinc and Lead Producers Association at a meeting recently held at Picher, Oklahoma. He discussed the Defense Production Act and said that under present world conditions the Tri-State district would be called upon for all-out production of lead and zinc and considerable government backing would be needed.

Fred Wise, general manager of Idarado Mining Company, operating the Treasury Tunnel, Meldrum Tunnel and Black Bear mine in Ouray and San Miguel Counties, Colorado, has been assigned the additional job of managing the Resurrection Mining Company's Leadville, Lake County, operations. Idarado is controlled by Newmont Mining Corporation, which also owns a one-third interest in Resurrection.

Thor H. Kiilsgaard has resigned as geologist for the Idaho Bureau of Mines and Geology and is now geologist for the Mineral Deposits Branch of the United States Geological Survey. He is working out of Spokane, Washington.

George Rust, mining engineer for the Mining Section of the Reconstruction Finance Corporation for the last 10 years, has resigned, effective not later than March 1, 1951. He plans to start private consulting work and mining operations. His headquarters will be in San Francisco, California.

Donald H. McLaughlin of Berkeley, president of the AIME, has been appointed by Governor Earl Warren as a member of the University of California board of regents.

Robert Fulton, former superintendent of the North Star mine at Grass Valley, California, has resigned to work in the consulting offices of *Fred Searls, Jr.*, president of Newmont Mining Corporation, New York.

Charles Baxter has left the Castile Mining Company at Ramsay, Michigan, and is working as chief engineer for the St. James Mining Company at Aurora, Minnesota.

S. Power Warren has discontinued his consulting work temporarily to return to Government work. He is with the Evaluation Branch of the Production and Expansion Division of the Defense Minerals Administration, and his address is now Falls Church, Virginia.

John B. Breymann, III, will start working soon for the American Cyanamid Company at Stamford, Connecticut, having resigned his job as metallurgist at the Shenandoah-Dives Mining Company, Silverton, Colorado.

Carlos Bardwell, superintendent of the International Smelting and Refining Company's smelter at Tooele, Utah, has been elected chairman of the Utah section of the AIME, succeeding *Byron E. Grant*. *W. G. Rouillard*, manager of the American Smelting and Refining Company's Garfield operations, was made vice chairman. *H. P. Allen*, Salt Lake City mining engineer, was re-elected secretary.

A. W. Pringle, having closed down mining operations for the season on Rhode Island Creek in the Manley Hot Springs area of Alaska, has gone to Seattle, Washington for the winter. *John Myklebust* and *Grover Gurtler* closed their mining operations at Ophir, Alaska, and Gurtler also plans to go to the states.

William M. Bowlus of Mineral Hills, Michigan, and engineer for M. A. Hanna Company's Bengal, Tully and Wauseca mines, has accepted a position as assistant professor of mining engineering at Michigan College of Mining and Technology. He will work under Professor J. Murray Riddell.

Charles Boggetto, George M. Honkala, John R. Salo, and *Anthony F. Rigoni*, underground men at the Davis-Geneva iron mine of the Oliver Iron Mining Company, have been made foremen. The mine is at Ironwood, Michigan.

Ed Farrell has returned to Fairbanks, Alaska, for the winter after a successful season mining on Morelock Creek. *Hans Tilleson* has left Alaska for Seattle, Washington, for the winter. He mines on Long Creek in the Ruby-Poorman district. *Rudy Kransi* is another who is back at Fairbanks with the closing of the Myrtle Creek mine for the season. Kransi is superintendent for Myrtle Creek mine and says over 300,000 cubic feet of bedrock had been treated. Other members of his crew which returned included *Orin Girdley, George Radek*, and *Eli Hendrickson*.

Arthur R. Still and *Alfred D. Wandke* have organized the Southwestern Geological Service, with headquarters at Box 1512, Prescott, Arizona. They propose to conduct a consulting geologic service for a limited number of regular clients, specializing in the small mine field. Wandke received his degree in geology from the University of Arizona in 1942, and after his military service spent four years at Harvard in graduate study and teaching. Still was graduated from the University of Arizona in mining geology, class of 1948, and spent last year at Harvard in graduate work.

W. Bruce Peck has been elected a director of the Morning Glory Mines which operates the Haywire and Keystone properties north of Troy, Lincoln County, Montana.

Harrie W. Mallery, after two years as resident geologist with the National Lead Company at Tahawus, New York, has resigned. He is now doing graduate work in geology at Syracuse University at Syracuse, New York.

S. K. Garrett, consulting engineer, has been retained as Coeur d'Alene representative of the Mudd mining interests in Idaho. The Mudd group controls the Arizona company, Coronado Copper and Zinc Company, which actually has employed Garrett up until now. He currently is operating a lease on the upper workings of the Nabob mine in Idaho and another lease on Constitution mine property.

ROY HARDY, veteran mining engineer of Reno, Nevada, whose more recent work has included being consultant for Getchell Mines and 1950 program chairman for the American Mining Congress, has been elected to the University of Nevada board of regents. Other regents elected with him were Dr. Louis E. Lombardi of Reno and Newton Crumley of Elko.

Bentonite . . or Barite . .

LORAINS Cut the Bill

AT NATIONAL LEAD!

▶ Here are two mining operations of the National Lead Company . . . one in Texas, one in Arkansas. Both jobs are Lorain equipped. But, each job called for a different material handling method. For one operation there was a need for a big 1-3/4 yd. Lorain shovel for digging hard overburden, to reach barite ore. Different conditions on the second job called for a Lorain TL Dragline to handle and cast loose material.

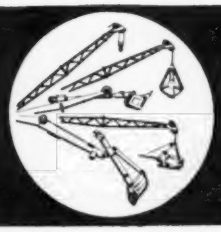
National Lead Company have built a fleet of 4 Lorains to meet a wide variety of work on their wide-spread operations. They chose Lorains because Lorains are available in a full range of sizes — big or small — as shovels, draglines, clams, or hoes — with crawler or rubber-tire mountings — to meet every stripping, mining and pit or quarry need. You can cut your production costs, too, with the right Lorain on your job . . . and your Thew-Lorain Distributor can show you how Lorains can fill the bill.

At their Marley, Texas property, *National Lead Company mine soft, porous Bentonite with a new Lorain TL-25 dragline. This is one of 4 Lorains owned by this well-known producer.*

Near Malvern, Arkansas, *National Lead's big 1-3/4 yd. Lorain-80 shovel strips tough material to reach barite which is processed and sold as Baroid for use in drilling oil wells. Here, the big Lorain is working on the floor of a 200 ft. deep pit, stripping hard shale for loading into trucks.*

THE THEW SHOVEL CO., LORAIN, OHIO

THEW **LORAIN**® *on CRAWLER or RUBBER*



SHOVELS
CRANES
DRAGLINES
CLAMSHELLS
HOES

WORLD MINING

The International Department of MINING WORLD

INTERNATIONAL PANORAMA

PARIS—The ECA has advanced $400,000 to the Upper Sanga Diamond and Gold Company for exploration and development of industrial diamond-bearing ground in the middle Congo and Oubanghi-Chari territories of Africa.

WASHINGTON—The National Production Authority has issued a regulating order designed to conserve tin. The military uses of tin will not be curtailed, however.

SAO PAULO—Increasing demands for cobalt have again focussed attention on Brazil's Sao Joao dos Toscantins oxidized-nickel cobalt deposits as a possible source of the metal.

SUDBURY, ONTARIO—The base price for electrolytic nickel has been raised to $0.505 per pound in Canada and for export except to the United States. The price had been $0.48 per pound since May 31, 1950.

WASHINGTON—The National Production Authority has allocated the use of cobalt in accordance with its end-use importance to national defense.

ALBUQUERQUE—More than 3,200 acres of Atchison Topeka and Santa Fe Railway System land in New Mexico are believed to be uranium-bearing. Immediate exploratory work costing $75,000 has been authorized by the company.

WASHINGTON—Aluminum has been recommended for use in soldiers' helmets, pontoon bridges, and for building trucks, jeeps and airborne 106 millimeter cannons.

MEXICO CITY—During the first 10 months of 1950 shipments of refined lead to the United States amounted to 181,039 tons compared with 104,153 tons in the same period of 1949.

NEW YORK—The price for cobalt granules has been increased from $1.80 to $2.10 per pound f.o.b. Port of New York or Niagara Falls, New York.

WASHINGTON—Interior Department Secretary Oscar Chapman has granted "necessity certificates" to Harvey Machine Company, Inc., and Apex Smelting & Refining Company to permit them to contract output to the government.

LONDON—Production of wolframite from mines at Kigesi, Uganda, will be increased 200 to 300 tons per year by an Anglo-American group aided by a loan from ECA.

CHICAGO—Production of steel in the United States during 1950 reached an all-time high of 96,713,276 tons.

MONTREAL—The Aluminum Company of Canada, Ltd., has negotiated a contract with the British Government for shipment of 150,000 metric tons of aluminum to the United Kingdom in 1951.

DULUTH—Total shipments of iron ore to Lower Lake Ports during 1950 was 78,205,681 gross tons compared to 1949 shipments of 69,556,269 tons.

ATHENS—Mediterranean Mines, Inc., has received an advance of $102,193 and 10,000,000 drachmae from the ECA for further expansion of mining and milling at the Laurium silver-lead-zinc mines near Athens.

PADUCAH, KENTUCKY—The Atomic Energy Commission has announced that a new plant to produce U-235 will be built on a 5,000-acre site near here. The gaseous-diffusion plant will separate fissionable U-235 from non-fissionable U-238.

JOHANNESBURG—Four South African gold mining companies have started plant construction to recover uranium from their gold ores. All output will be sold to the United States and the United Kingdom.

LONDON—The British Ministry of Supply started allocation of zinc on January 1st to British companies in accordance with their national importance.

TRAIL—The Consolidated Mining and Smelting Company of Canada plans to increase electrolytic-zinc refining capacity by 70 tons per day at a cost of $3,200,000.

NEW YORK—The United States Steel Corporation will build its new, wholly integrated, 1,800,000 ingot-ton Fairless steel plant at Morrisville, Pennsylvania.

JOHANNESBURG—Zaaiplatts Tin Mining Company is to increase milling capacity by 1,200 tons per month.

CAMDEN, NEW JERSEY—The National Steel Corporation will build a new steel mill on a 2,000-acre tract of land bordering the Delaware River.

NEW YORK—Imported mercury has sold at an increased price of $165.00 a flask delivered here. The June 1950 price was $50.00 per flask.

OTTAWA—The Steel Company of Canada, Limited, has started construction to increase plant capacity from 450,000 to 650,000 tons per year. The expansion program, to take 18 months, will cost $45,000,000.

WASHINGTON—Officials of the Economic Stabilization Agency have announced that there is no need for price ceiling on copper, lead and zinc at this time. However, the agency asked that it be given ample notice of any price increases to be made by producers.

NEW YORK—The price for foreign silver has been raised to 90.41 cents per ounce for commercial bar silver 999 fine. The price is the highest for foreign silver since 1920.

WASHINGTON—The federal government has announced that it will make no additional purchases of zinc for the stockpile for the remainder of the fiscal year ending June 30, 1951.

RIO DE JANEIRO—Air shipments of quartz crystals to the United States have been resumed. Since November 1950 three tons have been shipped.

LONDON—Production of steel by the British steel industry in 1950 reached an all-time high of 16,292,700 tons.

Higher World Silver Price Will Aid Mexican Miners

Mexican mines produce more silver than the mines of any other country, and the recent increases in the world price for silver will mean increased production and prosperity for Mexico.

According to Jesus Carrasco, general secretary of the miners' union, Mexico mines are prepared to increase output by 50 percent above the present 50,000,000-ounce yearly output, if the new price of $0.9016 holds for any length of time. Luis Latapi, manager of the mining bank, Credito Minero y Mercantil, S.A., said the higher price will certainly aid the economy of the country.

Use of Iron Pellets May Increase Steel Output

The Youngstown Sheet & Tube Company is making tests at its Campbell Works at Youngstown, Ohio, U.S.A., to determine if iron pellets extracted from taconite can help to increase steel production.

About 35,000 tons of iron pellets—or about one month's supply for one blast furnace when mixed with other ores—has been shipped to Youngstown and the pellets are either being smelted in the blast furnaces or used in open hearth charges. As the iron content of the pellets is about 68 percent, compared with 51½ percent in "quality" iron ores from Minnesota, existing furnaces may be able to increase output as there is less waste. Also fuel needs are reduced when smelting charges of greater iron content.

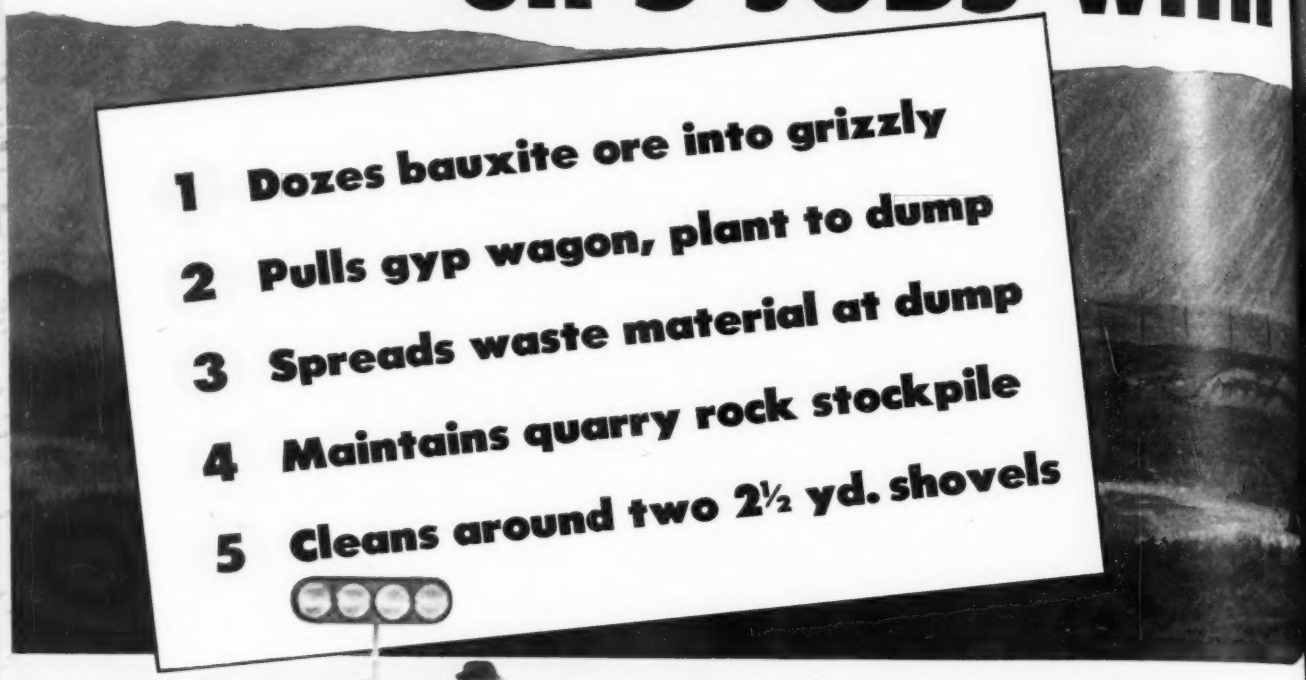
Copper Property Being Opened in Haiti

The East India Company, Inc., is preparing a copper property in the Grand Riviere du Nord district of Haiti in the West Indies for production about July, 1951. The company has been developing the property for some time and at present an estimated 10,000 tons of ore is available in several veins and oreshoots. Other unexplored veins are expected to raise that figure in time.

The company expects to produce about 250 tons of copper ore monthly at first and hopes gradually to produce about 500 tons monthly.

Arkansas Aluminum Plant

on 5 JOBS with



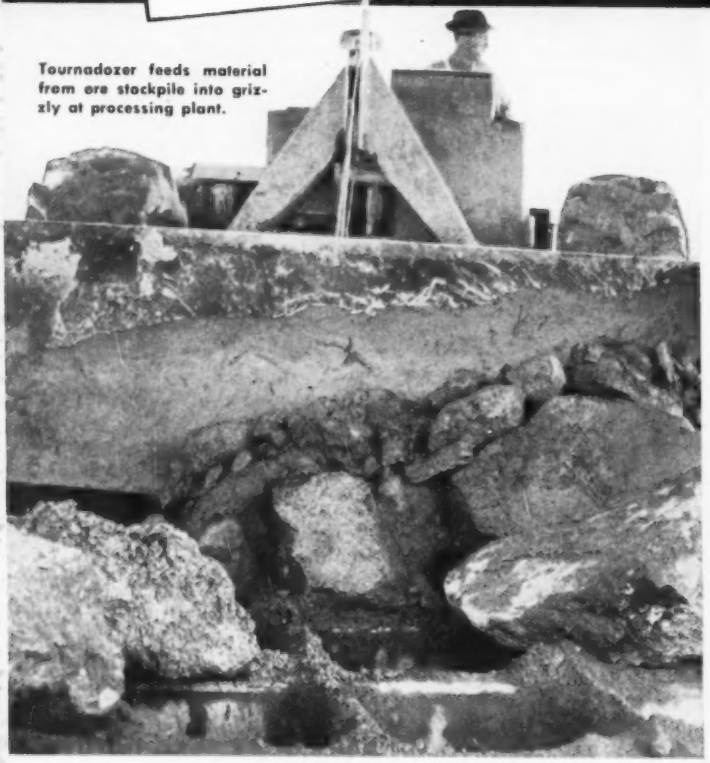
1 Dozes bauxite ore into grizzly

2 Pulls gyp wagon, plant to dump

3 Spreads waste material at dump

4 Maintains quarry rock stockpile

5 Cleans around two 2½ yd. shovels



Tournadozer feeds material from ore stockpile into grizzly at processing plant.

Near Little Rock, Arkansas,

a large Eastern manufacturing firm operates an ore pit and processing plant 24 hours a day. They are mining bauxite rock, which must be crushed, then processed to recover aluminum ore. On this multi-handling operation, they have the problem of doing a lot of widely-scattered dozer jobs within very short periods of time . . . and have found the answer in a 19 m.p.h., rubber-tired C Tournadozer. "This *one* LeTourneau machine has been doing the work of *two* crawlers on our operation," reports the Plant Superintendent.

Tournadozer's principal job during its regular 12-hour work schedule is dozing quarry rock into 4 to 8 grizzlies. It utilizes the previous waiting periods to handle waste disposal . . . pulling a 13-yd. bottom-dump wagon ½ mile from gyp conveyor to dump area . . . spreading the material . . . then returning ½ mile to conveyor, where wagon is uncoupled and reloaded while Tournadozer "lends a hand" on other odd-lot, maintenance-type jobs.

Mail to: R. G. LeTOURNEAU, INC., Peoria, Illinois

LeTOURNEAU LET EQUIPMENT

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TITLE.....

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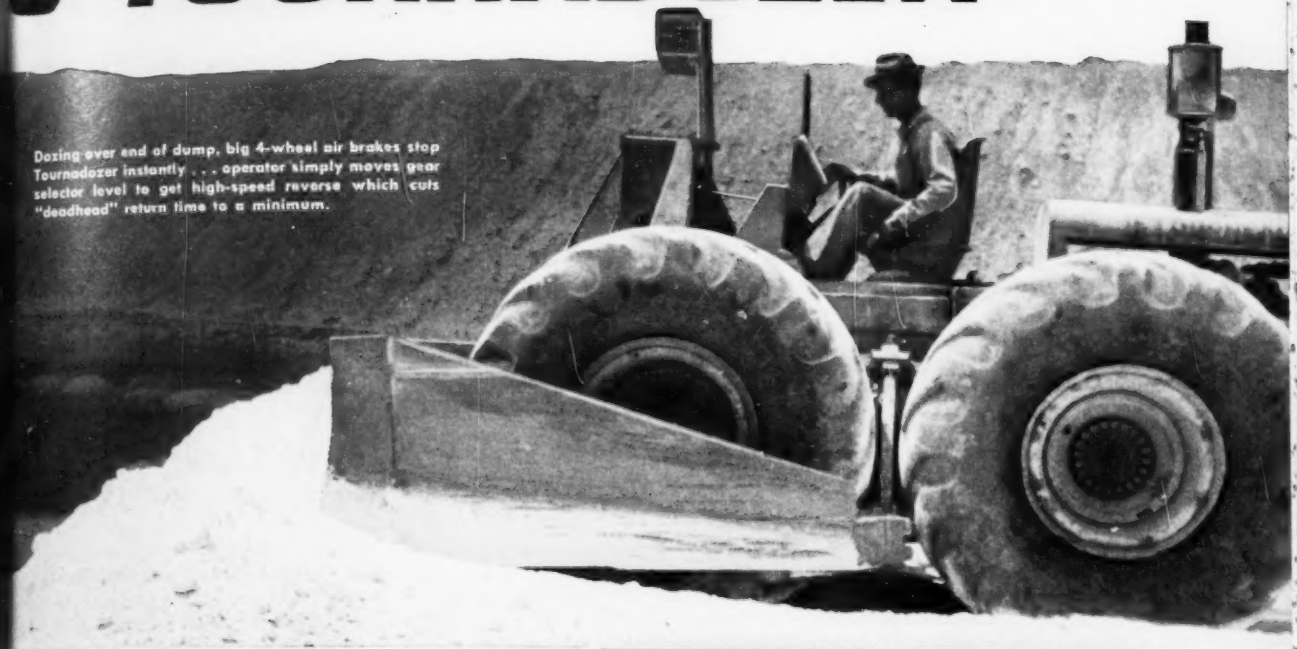
Please send information on

- ☐ 180 h.p., 19 m.p.h. C Tournadozer
- ☐ 122 h.p., 19 m.p.h. D Tournadozer

for use with:

- ☐ Bulldozer
- ☐ Carryall
- ☐ Angledozer
- ☐ Rooter
- ☐ Snow Plow
- ☐ Other Drawn Equipment
- ☐ Side Crane

doubles crawler output
C TOURNADOZER

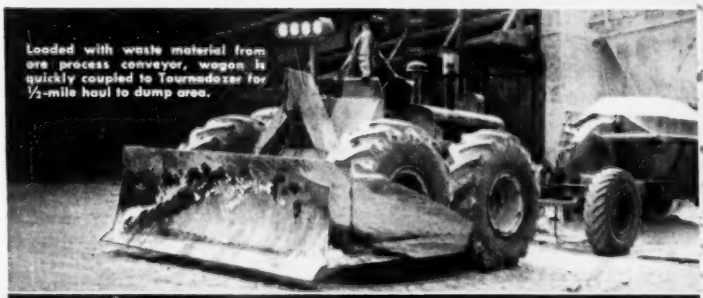


Dozing over end of dump, big 4-wheel air brakes stop Tournadozer instantly . . . operator simply moves gear selector level to get high-speed reverse which cuts "deadhead" return time to a minimum.

In addition, Tournadozer is on call 24 hours a day to level quarry rock stockpile . . . and to clean around 2 electric 2½-yd. shovels working inside storage sheds. In an average 24-hour period, the "C" travels between 30 and 35 miles, part of the distance over pavement, part cross-country . . . crosses railroad tracks and curbs without planking . . . works frequently on concrete without damage to surface or to tires.

On all five of these major dozing and pulling assignments, the versatile Tournadozer consistently outproduces crawler-type tractors. Its fast, "runabout" ability has helped maintain steady, balanced production of pit and plant at all times.

With Tournadozer's 19 m.p.h. forward and 8 m.p.h. reverse speeds, you, too, can do more jobs, and get more work done at a lower cost per job. Let your LeTourneau Distributor show you more job-proved facts and figures. Why not write, or call him . . . TODAY!



Loaded with waste material from ore process conveyor, wagon is quickly coupled to Tournadozer for ½-mile haul to dump area.

Tournadozer's 4-wheel drive on giant 21.00 x 25 tires gives rig plenty of power for pulling the 13-yd. wagon.

As waste material is dumped, high-speed C Tournadozer spreads previous load with its electric-control 2½-yd. bulldozer blade

Tournadozer, Angledozer, Carryall, Rooter—Trademark Reg. U.S. Pat. Off. M27

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PEORIA, ILLINOIS

JOB-PROVED The World Over

TOURNADOZERS

IT'S RUBBER THAT PUTS THE ACTION IN TRACTION

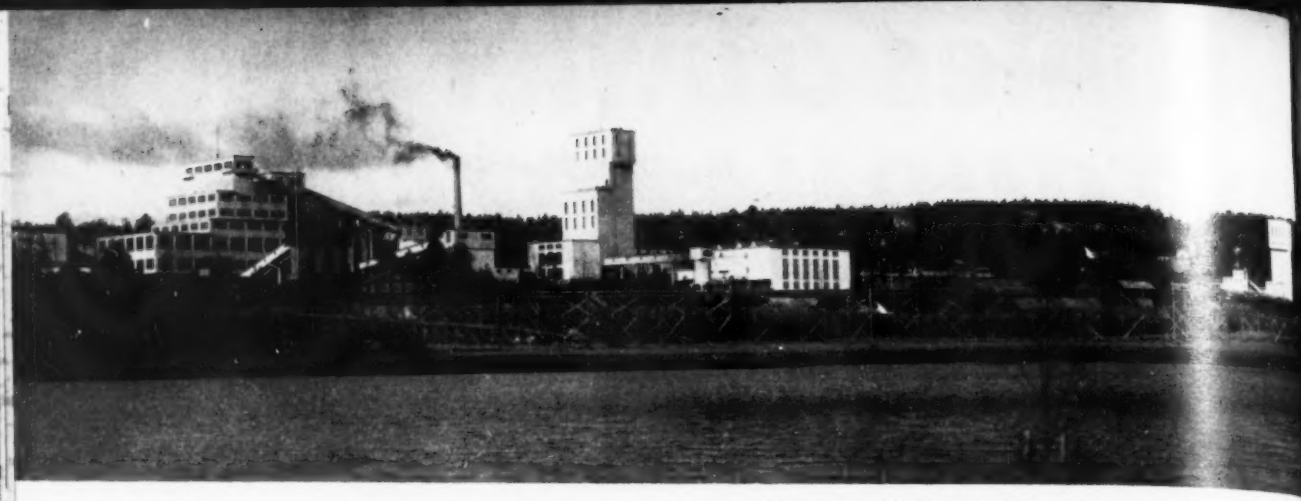


Photo courtesy Mr. H. Garde, Director, Grangesbergsbolaget, Stockholm.

This panoramic view of the Grangesberg surface plant, as seen looking west across the tailing pond, shows, from left to right, the concentrating plant, power plant, central shaft headframe, hoist house, and the headframe over the Jacobina shaft. All buildings are built of reinforced concrete.

GRANGESBERG IRON MINE (TGO),

With a yearly production in excess of 1,500,000 tons of high grade iron concentrate, is one of Sweden's largest and most progressive mining firms

The Grangesberg mines are located in the parish of Grangarde in the southernmost part of the province of Dalecarlia (Swedish: Dalarna), at 60°5′ North latitude and 3°25′ West longitude of the observatory of Stockholm. This is about 9½ miles southwest of Ludvika and 56 miles southwest of Falun. The ore zone extends to the south, where it is called the Lomberg field.

Increasing use of Eimco 12B RockerShovels is being made for loading ore on the sub levels. Note how the axles on the machine pictured above have been lengthened.

Photo courtesy of Mr. H. Garde, Director, Grangesbergsbolaget, Stockholm.

The ore deposits lie on the divide between the Kolbacks and the Arboga Rivers at an altitude of 260 to 320 meters. The country is very hilly with large forests and a great number of swamps and small lakes. Not far southwest of Grangesberg are the rather large lakes, Norra and Sodra Horken.

Owing to the altitude above sea level, the climate is more severe than at areas north and south of Grangesberg, snow falls earlier and remains longer, and spring is usually considerably later than at Ludvika, farther north. February is generally the coldest month, with an average temperature as low as 20° F. below zero. In July the temperature varies between 55° and 65° F.

The rain and snowfall is considerable in this district, 660 mm. on the average, while the average for Sweden is only about 540 mm. This high precipitation is of importance for the exploitation of water power in the district.

The mining district is surrounded by a 3,200 acre community forest allotted to the Grangesberg Mines. The boundaries of the Grangesberg concession are the same as the forest boundaries. The heavily wooded area covers about 1,500 acres.

The Trafikaktiebolaget Grangesberg-Oxelosund (TGO) and its subsidiary company, Grangesbergs Grufve Aktiebolag, own 80 claims in the northern, central, and southern part of the district. The Stora Kopparbergs Bergslags Aktiebolag owns 20 claims in the northern section. The Lomberg ore field south of the Export deposit, or Export faltet, the largest claim, and the Bjornberg district east of the latter are owned by some Swedish iron companies.

Geology of the District

The iron ore district extends from Sodra Horken lake to Grasberg, a distance of about 30 km. The Grangesberg is the southernmost of the series of deposits. The ore zone strikes N.N.E. to S.S.W. and has an average dip of 65° to the East. The ore occurs in a formation of "leptite" grading in color from reddish (rich in potassium) to gray (rich in sodium), the latter enclosing the orebody in the "Exportfaltet."

The leptite formation is intruded by two granites, one enclosing the "Gudmundberg"; the other granite intrusion is west of the Lomberg field in the southern part of the ore zone.

The iron ore zone is delimited on the east by a coarse intermediate granite, enclosed as a thick lense-shaped body in the masses of leptite.

Both the leptite and the granites are cut by dikes of diabase and are thought to be the youngest rocks in the ore zone. A great many dikes of pegmatite cut these rocks.

The ores, rather high in phosphorus, occur as large irregularly-shaped lenses with a length of about 1,000 meters and a width between 20 and 95 meters. The ore field is

cut by several amphibolite dikes, younger than the surrounding rock. Numerous pegmatite dikes also cut across the body.

Long Mining History

The Grangesberg mines were first worked in 1584. The ore was originally mined at a great many small mines by the State as well as by small foundries. Owing to its high phosphorus content it produced iron of inferior quality, and its use was under control of the State. In the year 1757 over 100 small mines operated. Not until the Thomas method was introduced for production of iron from ores rich in phosphorus did the output rise, in 1890, to more extensive proportions; at the same time exports also rose.

Early Hoisting and Pumping

Formerly, when the mines were not so deep, the broken ore as well as the water was raised by hand or by means of engines drawn by horses. When the production rose and the mines became deeper, mechanical contrivances were needed. For this purpose water wheels driven by waterfalls were used. From these wheels power was conveyed by means of lines of wooden conducting poles, to drive the hoisting machinery and water engines. In 1777 the foremost mine owners, the smelting works at Gravendal, Fredriksberg, Hellsjon and Malingsbo, formed a company for utilizing water power in mining. This company built the first water wheel between the small lake Ormbergstjarn and the Sodra Horken. Thereafter a number of water wheels, ponds, and canals were made for gathering and leading the water to the water wheels, and when the Grangesbergs Stora Konstbolag was founded in 1847 there were in and around Grangesberg seven water wheels, 10 ponds, 44,500 meters of canals, 6,850 meters of conducting poles and 5,200 meters of wire lines. At present electric power is used exclusively.

Mining Methods

In the early days mining was carried on in open pits, but as the mines became deeper this method was abandoned in favor of underground workings. The Grangesberg mine was developed through two vertical shafts, the Muller and Carl Johan, both sunk in the hanging-wall. The ore was mined in slots eight meters wide with pillars 10 meters wide between them. The slot method was used to a depth of 150 meters, but when difficulties arose owing to the weakness of the hanging-wall when the broken ore in the slot was drawn, the method was changed to sub-level caving.

The main levels are spaced 40 meters apart and the sub-levels at five meters intervals. Drifts on the sub-levels are driven along the footwall. At intervals of 10 meters along these drifts, cross-cuts are driven through to the hanging-wall, the maximum length of a cross-cut being about 90 meters. Raises, three meters in the footwall, are put up in pairs at intervals of 30 to 50 meters to connect the sub-levels.

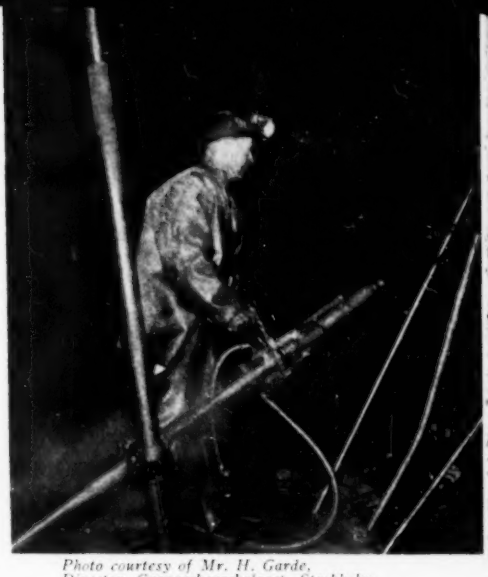


Photo courtesy of Mr. H. Garde, Director, Grangesbergsbolaget, Stockholm.

Holes up to five meters in length are drilled in the stopes, using special low-carbon drill steel. Note the reverse feed stoper mounted on the air-actuated column.

One is used for high-grade ore and the other for ordinary run-of-mine ore. Raises are two meters square, and at every alternate pair, a third raise is driven for the movement of men and steel. Small end-dumping cars with an individual capacity of about one ton are used for transporting broken ore from the sub-levels to the raises.

Loading the ore with air-driven loaders is increasingly used and is thought to be the best general method yet applied. In this system the crosscuts are driven at intervals of six meters along the drift. The load-

LEFT: Here, ore is being loaded into 3.5-ton-capacity side dump cars on the main haulage level. Note the use of swinging baffles to deflect the ore into the cars. RIGHT: The hard, magnetite ore is drilled by jackhammers mounted on airlegs. The drill is ⅞ inch hexagonal with tungsten carbide chisel bits. The use of lightweight drills, jacklegs and tungsten carbide bits insures rapid, low cost drilling in the tough massive ore.

Photos courtesy American Swedish News Exchange, Inc.

ers are the Swedish type, Atlas LM 20, and American-built Eimco loaders. The end-dumping cars have a capacity of 0.84 cubic meters and each hold about two tons.

On the main underground haulage levels the ore is discharged into side-dumping cars holding about 3½ tons. There are skip pockets with a capacity of 5,000 tons on each level. The broken ore discharges from these through gates, operated by compressed air, into small 11- to 14-ton capacity pockets which feed the skips.

Skips, of seven-ton capacity, are used in both shafts, the hoisting speed being up to eight meters per second. About 8,000 tons are hoisted per day from the two shafts. The skips, either dumping skips or bottom dischargers, each have a maximum capacity of 15 tons. The man cages are two-decked, holding 50 men.

Shafts and Hoisting Machinery

The Central shaft, used for hoisting iron ore and rock as well as half of the miners, is a 3 by 16-meter rectangle. It is divided into compartments for four skips, two man-cages, a ladder compartment, and space for air and water pipes and electric power lines.

The shaft house is built of reinforced concrete. It is 49.5 meters high over the entrance. There are three 300-ton storage bins, two for iron ore; a crushing plant with screens and conveyors and storage rooms for material; and space for drill sharpening in the shaft building. Three compressors furnish air —two Ingersoll-Rand type XV-2 and one turbo-compressor.

One of the hoisting machines is manufactured by the Swedish company ASEA, the second by Siemens with Morgardshammars Mekaniska Verkstad as submanufacturer. Motor and drums are arranged on the same shaft. The hoisting motor is served by a Ward-Leonard transformer. The man hoists are a Koepe type with directly connected motors. The two ore hoists are constructed for a maximum depth of 1,000 meters at a maximum hoisting velocity of 15 meters per second with a capacity of 14.5 tons per skip. Each of the motors, operating at 44 rpm., needs a current of 2,900 kw. at 1,400 volts. The hoist-drums and cable sheaves are seven meters in diameter.

The man hoist is a Koepe type, constructed for a maximum depth of 1,000 meters. The weight of the hoist is seven tons and the useful load 6½ tons. The diameter of the drum is five meters, and the cable is 64 mm. in diameter.

The Jacobina shaft is situated in the foot-wall about 460 meters north of the Central shaft and used solely as a man shaft. The shaft building is 45.6 meters high with the Koepe type hoisting machinery built in the top. The hoisting machinery is constructed for a maximum hoisting velocity of 12 meters per second, hoisting 5.2 tons and a useful load of four tons. The diameter of the drums is six meters. The diameter of the cable is 64 mm.

The three-compartment miners' change house west of the Central shafts has accommodation for 460 men. The dining hall is also west of the shaft. It seats 180 miners at the same time. The company has given this department free to the miners' restaurant union.

Concentrate from the mill is stockpiled awaiting shipment.

Photo courtesy Mr. H. Garde, Director, Grangesbergsbolaget, Stockholm.

Power

Electric power for the mines is delivered by the company's power stations: Mockfjard (the TGO and Stora Kopparbergs Bergslags Aktiebolag each own one-half) in the Vasterdalalven, with a capacity of 13,000 kw., at 55,000 volts; Lernbo power station, with 6,000 k.w., Hellsjo and Enkullen power stations, each of 600 kw. The consumption of power at the mines of the Grangesberg Company is about 6,000 kw., the rest of the power is sold.

Production

The yearly output of iron concentrate is about 1,500,000 tons, and the total ore hoisted is about 2,000,000 tons annually. The ore is hoisted through the Central shaft. The ore is crushed, screened and concentrated to an iron content of about 60 percent with 0.8 to 1.0 percent phosphorus. About 51,000,000 tons of iron ore have been mined in the district. The tailing is treated by flotation for the recovery of apatite when the need arises.

Workmen and Dwellings

The number of workmen in mines and concentrating plant is about 500, building department about 240, workshops about 120, and the total, including foremen, about 1,200. In addition to this the mines of Stora Kopparbergs Bergslags Aktiebolag at Grangesberg employ about 125 men.

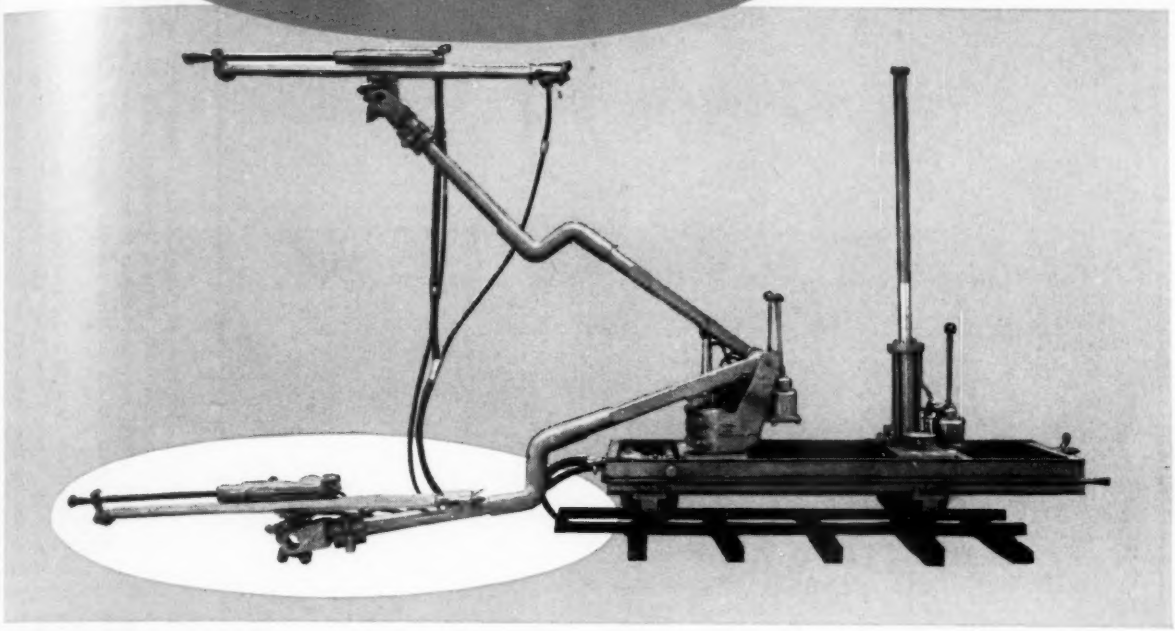
The company has 1,000 apartments with 2,200 rooms for its employees. Formerly apartments for workmen usually contained one room and a kitchen, the newer ones have two or three rooms and a kitchen. The company stimulates home building by employees by cheap building sites, laying out of ways, pipe lines for water, and electric lines, and contributes 400 Swedish crowns per room and a maximum of 2,000 crowns per apartment. The builder generally gets a building loan from the State with addition of so-called "tertiary loan." There are now 400 employee-owned homes in Grangesberg.

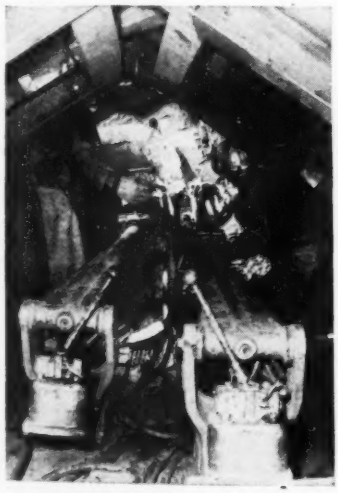
Export Shipments

For export, the ore is transported by the TGO railroad to the port of Oxelosund on the Baltic Sea (about 265 kilometers southeast of Grangesberg), where it is loaded into vessels by means of the company's various loading machines. The bulk of the present exports goes to British customers, who, since the last war, appreciate more and more the quality of the Grangesberg ore. The total exports during a normal year amount to about 1,000,000 to 1,200,000 tons.

GIVE YOUR LIFTERS A LIFT!

Complete truck-mounted units include hydraulic roof jack and either one, two or three drill booms.





Hydraulic boom and roof jack units are available separately for mounting on your own custom-built jumbo.

These offset booms are great time-savers when you're drilling the lifters. Your runner doesn't have to take time out to swing the drill under — steel is easily and quickly centered on *every* hole in the face.

And that's only one of the *many* big advantages of Gardner-Denver Hydraulic Drill Jumbos. Other features include:

- **Faster set-up—move in and start drilling.**
- **Faster tearing down—release hydraulic pressure and the jumbo's off to another heading.**
- **"Creep-free" booms—hold steel steady and true.**
- **Hydraulic roof jacks—hold truck on-the-spot.**
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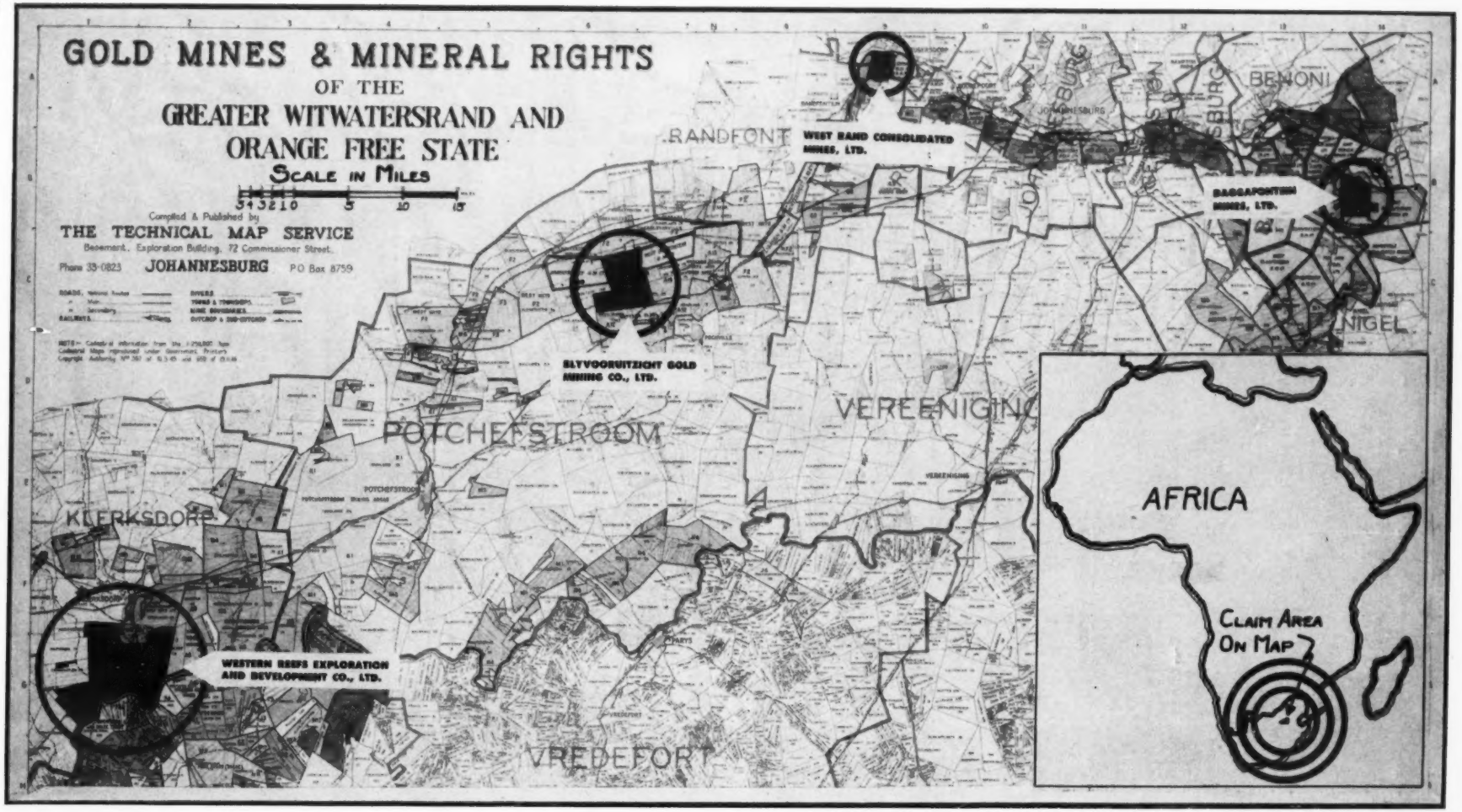

Courtesy of the Technical Map Service, Johannesburg.

The map reproduced above shows the full extent of the mines of the greater Witwatersrand, extending about 140 miles northeasterly through Klerksdorp, Potchefstroom, Vereeniging and Heidelburgand. The city of Johannesburg, capitol of the Union of South Africa, is at the top right center.

The first four gold mines to sign an agreement for uranium production for the governments of the United States and the United Kingdom are, from left to right: Western Reefs Exploration and Development Company, Limited; Blyvooruitzicht Gold Mining Company, Limited. West Rand Consolidated Mines, Limited; and Daggafontein Mines, Limited.

The great new goldfield in the Orange Free State is south of the Vaal River and south of the mines shown on this map (The map title is at the north end).

MINING WORLD has added the index map of Africa, lower right, has darkened the four companies' holdings, and has enlarged the map scale in the interest of completeness and ease of reading.

URANIUM RECOVERY PLANTS ARE NOW UNDER CONSTRUCTION AT FOUR RAND GOLD MINES

The simultaneous announcements in London, Johannesburg and Washington of commercial production of by-product uranium from South African gold ores has aroused great interest in mining districts throughout the world.

This interest is due, primarily, to the vast scale of gold mining on the Witwatersrand and the rapid development of the goldfields of the Orange Free State, which brings to mind the statement of J. W. Musset, South African Minister for Economic Development, on April 21, 1948, when he said, "We believe we have more uranium in this country than in any other country in the world." This belief was sustained by Mines Minister Eric Louw when he told the Parliament of the Union of South Africa on June 16, 1949 that, "In the total . . . it means a very big amount of uranium." Uranium content of the gold ore is small but mining is on a gigantic scale.

The existence of uranium minerals in the gold ores of the greater Witwatersrand and in boreholes in the Orange Free State was first announced by Governor General Gideon Brand Van Zyl, January 16, 1948. Since then three years of intensive research followed by pilot plant operation has been necessary to perfect an economical recovery method.

All uranium will be sold to the governments of the United States and the United Kingdom under the terms of a 10 year agreement made with the government of the Union of South Africa. The agreement concluded negotiations between the three countries that began some time ago and included two meetings held in Johannesburg, the first held one year ago and the last late in 1950.

Funds to cover the capital cost of the uranium processing plants will be loaned by the United States and the United Kingdom on a banking basis, if requested by South Africa.

Initial uranium production will come from four properties, and the South African government will consider construction of additional uranium recovery plants at other properties as warranted.

A brief summary of each of the four mines follows:

Western Reefs Exploration and Development Co., Ltd.

This company is one of the Anglo-American group of mines. There are eight known, ore-bearing reefs which are reached through two main shafts and are badly faulted, complicating mining operations. Milling operations started at the end of June 1941 and to January 1, 1947 a total of 5,011,500 tons of ore was milled. In 1950 the milling rate averaged 94,000 tons per month and the average monthly profit was £124,000. Ore reserves, estimated by a South African source, were sufficient for 40 years of mining, the longest for any producing Rand mine. Gold production during September 1950 was 21,588 ounces from 93,500 tons of ore. The ore is the eighth highest grade on the Rand, i.e. 4.67 dwt. per ton. Estimated additional profit from uranium is three pence per share per year.

Blyvooruitzicht Gold Mining Co., Ltd.

This company is one of the Corner House group of mines. Production of gold started in February 1942. The mine is developed through two shafts over 5,000 feet deep. In 1950 a total of 35,741 feet of development heading was driven of which 13,740 feet were in ore averaging 45.4 dwt. over a width of 11 inches. In the No. 2 shaft area, frequent water-bearing fissures were encountered. Increased pumping capacity has been added and pre-cementation of mining areas has been necessary. Sub inclined shafts are being sunk. In 1948, 628,702 tons of ore was mined, and in 1950 output had been raised to an average of 85,000 tons per month. Milling plant expansion under progress will allow monthly tonnage treated to be increased to 120,000. In September 1950 the company was the largest gold producer on the Rand—63,148 ounces—from by far the highest grade ore—14.69 dwt. per ton. Sub Nigel, Ltd.'s was second highest at 7.62. Ore reserves of Blyvooruitzicht are reported third largest in the Rand. Estimated uranium profits are two pence per share per year.

West Rand Consolidated Mines, Ltd.

This company is one of the General Mining and Finance Corporation group of mines. Ore is mined from six reefs. Mining started in 1908 in what was then the west corner of the "Old Rand." To 1947, 45,540,110 tons of ore was mined. In 1950 milling was at the average rate of 223,000 tons per month for an average profit of £185,000. In September 1950, 35,124 ounces of gold was recovered from 216,000 tons of ore. Ore reserves at this fourth largest (daily tonnage treated) mine have been estimated at 25 years. Profits from uranium are estimated from 9 to 12 pence per share per year.

Daggafontein Mines, Ltd.

This Anglo-American group mine is on the Far East Rand and is developed through three vertical shafts to depths over 3,500 feet. Ore is mined largely from the Main Reef Leader and the Kimberley Reef. In 1950, an average of 240,000 tons of ore was mined monthly and the average profit was £480,000. In September 1950, the company was the second largest Rand gold producer—59,033 ounces from 233,000 tons. It mines the fifth highest grade ore, averaging 5.07 dwt. per ton. Uranium profits are estimated at 4½ pence per year.

Security Considerations

Because of security considerations no data are available about uranium recovery plant design and construction except that it is proceeding on an urgent basis. For the same reason no figures on production or price to be paid for the uranium are available. However, the following observations have been made about the uranium: It is widespread geographically; the Bird Reef, the Carbon Leader Reef, the Main Reef Leader, and the Kimberley Reef appear to contain the greatest concentration. What the gold-uranium relation, if any, may be has not been announced, but the four mines not only have a greater-than-average gold content than the 39 other major producers on the Rand, but also have a longer-than-average life expectancy.

War-Born Mines Produce Uranium

A lesson for all governments can be gained by the fact that the Union government encouraged mining during World War II when other countries' gold mines were forced to close. Under government encouragement two of these mines first produced during the war. It is hoped their minerals will aid in preventing a third World War.

has darkened the four companies' holdings, and has enlarged the map scale in the interest of completeness and ease of reading.

tion for the governments of the United States and the United Kingdom are, from left to right: Western Reefs Exploration and Development

Today's power

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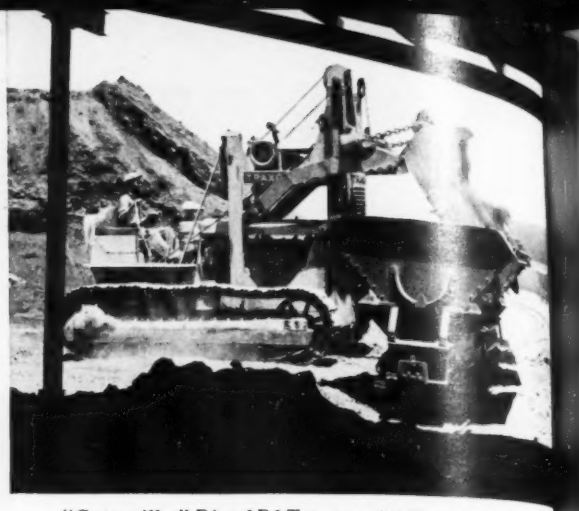

"Caterpillar" Diesel D6 Tractor with Traxcavator loading iron pyrites from stockpile into railroad cars for the Hellenic Mining Co., Ltd., Isle of Cyprus. (See main text about additional "Caterpillar" equipment.)

This 12-ton Plymouth locomotive, powered with a "Caterpillar" Diesel D13000 Engine, hauls 6 to 15 cars (8 to 9 tons gross weight each) over an 11½-kilometer track from Hellenic's mine to plant. A second unit is similarly "Caterpillar"-powered.

CYPRUS, colony of the early Phoenicians and many successive nations of history, is the scene of this development of an ages-old natural resource through the use of modern methods, machinery and power.

Two "Caterpillar" D6 Tractors with Traxcavators
One "Caterpillar" D4 Tractor with Traxcavator
Two "Caterpillar"-powered Plymouth locomotives
Two "Caterpillar" D4400 stationary Engines

are operated by the Hellenic Mining Co., Ltd., of Nicosia, Isle of Cyprus, in the handling of iron pyrites. "Caterpillar" equipment was preferred because it takes rugged equipment to handle this very heavy mineral.

Extracurricular duties for the tractors include loading out mined, shot gypsum into hoppers at the mine, and stockpiling material at the plant. Production averages 700 tons of pyrites and 200 tons of gypsum per day.

To today's economic needs, military requirements are adding heavy demands for "Caterpillar" products. Talk over your machinery requirements with your "Caterpillar" dealer. He has ample parts stocks to keep your present equipment doing its job and will do his utmost to make prompt delivery of new machines.

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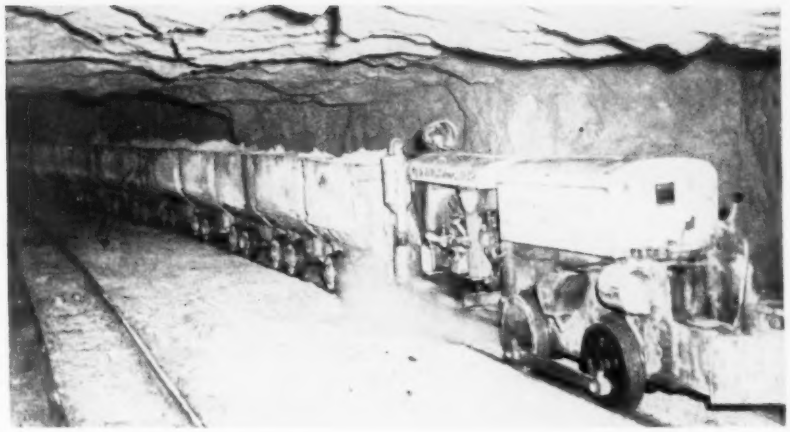


The Ruth Diesel at the Universal Exploration Company's zinc mine at Jefferson City, Tennessee hauls an average of 261 tons per shift. Each round trip is 1.2 miles, and fuel consumption is .351 gallons per mile which is equivalent to 0.0135 gallon of Diesel fuel per ton mile.

DIESEL LOCOMOTIVES UNDERGROUND

An articulated Diesel-powered trammer with an exhaust gas conditioner has proved to be both safe and economical in a Tennessee zinc mine

Mine operators should find much of interest in this article by Mr. Brophy describing the use of a new type of small Diesel trammer. The article was originally presented at the Mining Section of the National Safety Congress meeting in Chicago on October 16, 1950, and is reproduced in condensed form—Ed.

By Frank B. Brophy
Assistant General Superintendent
Universal Exploration Company
Jefferson City, Tennessee.

In December, 1949, the Universal Exploration Company installed a Diesel locomotive in its zinc mine at Jefferson City, Tennessee, to supplant the small storage-battery trammers that had to travel beyond their efficient range on the main haulageway. The storage-battery trammers thus released are now used for gathering purposes.

Past practice at this mine has been to transfer the storage-battery trammers from level to level as the need arose and to take them to the surface for repairs when needed. As the cage platform is 4 feet by 6 feet 2 inches, it is too small to accommodate a storage-battery locomotive having ample horsepower to do the above-described work. The problem, then, was to find a more powerful engine that could be used under existent conditions.

We investigated the possibility of using a small, articulated Diesel hauler, which was being manufactured, and found that from a physical standpoint it suited our condition exactly and fitted into our system of haulage.

The next problem confronting us was to determine to what degree the exhaust gases would affect the mine atmosphere, particularly the air in the stopes adjacent to the main haulageway through which the principal air currents travel. Information furnished by the U. S. Bureau of Mines, the manufacturer, and from visits to the Great Western Sugar Company's operation at Horse Creek, Wyoming, and the Eagle Picher Mining and Smelting Company's operations at Picher, Oklahoma, satisfied us as to the safety of the men underground if adequate ventilation was provided. This we had, as the volume of air passing through the area in which the Diesel locomotive would operate amounted to 37,000 cfm., which is far in excess of the volume necessary for safe operation. Seventy-five cfm. per brake horsepower at maximum load and speed is considered enough by the U. S. Bureau of Mines when the Diesel engine is operated in virtually normal mine air.

Diesel Trammer Description

The three-ton 24-inch-gage Diesel trammer selected consists of two parts: The power (drive) unit and the traction (driven) unit. The locomotive is 48 inches high, 39 inches wide, and 14 feet long. By uncoupling the power unit and unbolting the front bumper and the operator's platform, the locomotive can be handled in two parts on our cage. It is powered by a 2-cylinder, 4-cycle Diesel engine that develops 20 horsepower at 1,200 rpm. and 30 horsepower at 1,800 rpm. The manifold is water-cooled, and the engine exhaust gas is treated in a stainless steel conditioner attached to the front of the engine unit.

The engine flywheel is drilled for and equipped with a twin-disc fluid coupling. The drive unit is connected to the driven unit by a double mechanic's universal joint, the center of which is at the point of articulation. On a 10-foot-radius curve, the angularity of the universal joint is well within the maximum angularity permitted by the manufacturer. This unit, functioning in a similar manner to the pilot truck on a locomotive, has proved to be quite advantageous in preventing derailment.

The locomotive has a maximum speed of 6.0 miles per hour and a nominal 800 pounds of drawbar pull. In actual operation the speed averages 4.7 miles per hour. Testing the drawbar pull with a dynamometer indicated 1,040 pounds at starting and 650 pounds thereafter, while hauling 15 empty cars weighing 2,200 pounds each up a 0.5 percent grade. The engine is started with an air motor using compressed air from the regular underground air line, and, once started, the fluid coupling prevents the load from stalling the engine.

Exhaust Gas Conditioner

The conditioner, or scrubber, is 15 inches wide, 17 inches long, and 34 inches high and is divided into two compartments: A small one containing 5¾ by 18 inch stainless-steel

The three-ton, 24-inch-gage, ar... ted Diesel-powered trammer is 48 in... high, 39 inches wide and 14 feet lon... can be handled in two parts on the ... y 6 foot 2 inch mine cage however. Th... ammer is equipped with an exhaust gas ... itioner to reduce the deleterious consti... s of the engine exhaust gases and to lo... the temperature of the final exh... st.

diffusion tubes through which the exhaust gases from the engine pass to the bottom of the compartment and into the large compartment and through a water bath of 23 gallons. After scrubbing, the exhaust gases pass through limestone (rocks 2 to 2½ inches in size) held in racks above the water level, thence through a cyclone separator attached to the outside of the tank, which separates the mechanically entrained water and returns it to the tank. The cleaned gas then passes down the exhaust pipe on the end of which is a venturi jet, which dilutes the gas from the conditioner with five parts of general mine air before discharging it into the general mine atmosphere just above the track. The final exhaust gas has the same appearance as steam at a temperature of approximately 95°F.

The function of the water in the conditioner is to reduce the deleterious constituents of the engine exhaust gases and at the same time lower the temperature of the final exhaust gas. To accomplish this, the gas must be highly diffused in and violently agitated with the water. After this is done, the cycle is to separate the water from the exhaust gas and neutralize the acids that can be neutralized. The violent agitation created by the simulated air-lift circulation continually sprays the coarse limestone superimposed above the conditioner's agitation compartment with the conditioner liquid. The large surface areas of the limestone exposed to the ascending water and exhaust gas separates the water from the gas as they pass through the interstices. The water trickles back into the conditioner liquid and the cooled exhaust gas passes out through the wetted limestone. Oxides of nitrogen coming into contact with the water in the bath react to form nitrogen acids; these acids are neutralized by the limestone and are converted to nitrates and nitrites. The water in the conditioner normally had a pH of 3.0 without the limestone reaction but rose to 6.5 when limestone was added.

Results of Scrubber Operation

Test and analyses of the Diesel scrubber water showed that elemental nitrogen was present largely as nitrates and nitrites ranging from 36 to 47 ppm. by weight. This is equivalent to 160 to 212 ppm. of nitric acid that is neutralized by the limestone and retained in the scrubber. The tests show, when considered in relation to the large volume of conditioner liquid, that the oxides of nitrogen produced by the Diesel engine are substantially removed. From samples taken of the engine exhaust gas before it enters the conditioner and after leaving it, it is apparent that oxides of nitrogen are satisfactorily removed. That aldehydes are absorbed by the conditioner is demonstrated either by their absence or by the presence of negligible quantities in the final exhaust gas. The sulphur in the fuel oil is also oxidized, absorbed, and removed as calcium sulphate, the tests showing 39 to 85 ppm.

As significant amounts of particulate matter (principally carbon particles) and aldehydes are trapped in the scrubber, we have found it desirable to drain the tank at the end of each shift and to clean the carbon particles off the small diffusion tubes once a week.

Mine Air Surveys

In recent surveys of the mine atmosphere by the Tennessee Department of Public Health and the U. S. Bureau of Mines, carbon monoxide and oxides of nitrogen were found much below tolerance limits, and aldehydes and other combustion products were not present in amounts sufficient to be classed as irritants that would cause discomfort to the men working in the ...inity of the Diesel locomotive. Th... survey also showed that all toxic ...ases discharged through the condit...ner seldom exceeded the allowable limits set by the above-named bureaus. These limits are 0.0025 percent or 25 ppm., for oxides of nitrogen; 0.01 percent, or 100 ppm., for carbon monoxide; and 0.001 percent, or 10 ppm., for aldehydes.

Carbon Monoxide

Nineteen samples taken for carbon monoxide determinations near the Diesel and at various points in the neighborhood ranged from nil to a trace. At the same time, three samples taken near the engine ranged from 10 to 20 ppm., and one direct from the engine exhaust after passing through the venturi jet showed 50 ppm. Five samples taken before the exhaust gas entered the scrubber showed from 130 to 200 ppm. Two samples taken of the final engine exhaust before the gases reached the venturi jet showed 125 and 200 ppm., and 25 and 40 ppm. when discharged into the general mine atmosphere. Samples of the general mine atmosphere showed negligible quantities.

Oxides of Nitrogen

Oxides of nitrogen samples taken by S. H. Ash of the U. S. Bureau of Mines showed an average 5 ppm. in the areas through which the Diesel operated and beyond to the exhaust fans. Of four carbon monoxide samples taken, one showed 25 ppm. and the other three nothing. The volume of ventilating air ranged from 13,000 to 37,000 cfm.

To differentiate between oxides of nitrogen from sources other than the Diesel engine, such as gases from blasting or the same gases subsequently liberated from muck piles by scraping, tests of the mine atmosphere were started on a Saturday morning when the mine was down. The first sample, taken five hours after shooting, showed four ppm., and the sample taken in the afternoon showed seven ppm. Testing was resumed on Monday morning before the start of the shift with negative results. At 9:30 a.m., with the Diesel and slushers operating, eight ppm. were found. One hour later the locomotive was stopped for 30 minutes and a sample was taken

then showed one ppm. Arithmetically, therefore, the Diesel could be charged with producing seven ppm. On Tuesday, with all equipment operating, one sample showed three ppm. During the testing, the volume of air ranged from 34,000 to 39,000 cfm., and the barometer readings ranged from 28.75 to 28.95.

The foregoing test convinced us that with such small amounts of oxides of nitrogen present, it does not make much difference where the gas originates. Results of samples taken for aldehydes where the locomotive traveled at various times ranged from 1 ppm. to 12 ppm. One sample taken before the engine exhaust gases entered the conditioner showed 28 ppm. and 2.5 ppm. after leaving the venturi jet while the engine was idling, then 4.0 ppm. at full speed.

Diesel Exhaust Gas Hazards

Authorities seem to agree that the main hazards in Diesel-engine exhaust gases are carbon monoxide, oxides of nitrogen, and aldehydes. Of these, only the aldehydes give warning of their presence by noticeable odors, and, as they are the most readily soluble in water, the scrubber is probably more efficient in their removal.

Carbon monoxide having a maximum allowable concentration of 100 ppm. compared with 25 ppm. for oxides of nitrogen apparently has the lesser hazard in the opinion of Public Health officials. According to Elkins (Chemistry of Industrial Toxicology) Diesel output of carbon monoxide is admittedly low and, at times, negligible. Of the three gases, carbon monoxide is considered insoluble in water, and the scrubber is not effective in its removal, though in our opinion its retention by reaction in the bath should be considered, together with the aldehydes, in an estimation of the high oxygen demand found.

Of the oxides of nitrogen, our tests, covering some five months of operation, show that the nitrogen content of the scrubber water stays within certain ranges and is nearly constant from day to day. This constancy has come about through increasing appreciation of the need for proper attention and drainage by the operating crews.

Operating Results

Three small storage-battery trammers were used to haul the tonnage from a certain area in the mine to the shaft before acquiring the Diesel locomotive. When the Diesel was put into service, it was used exclusively for main haulage work, and two of the three storage-battery trammers were used for gathering purposes.

The third trammer was sent to another part of the mine. When larger rails are laid in the areas where the trammers are being operated, the Diesel locomotive can and will take over the duties of either one or both of the small trammers. At that time we will be able to get a true idea of the difference in the operating cost, which we believe will be considerably lower when the Diesel is used exclusively.

For two months, 261 tons per shift, per round trip of 1.2 miles, was hauled by the Diesel locomotive, which traveled an average of 2.85 miles per gallon of Diesel oil, or required 0.0135 gallon of Diesel oil per ton-mile. The upkeep cost to date has been satisfactory.

Summary

Summarizing the results of the above-described tests on the adequacy of the scrubber, the figures we have to date show that, although carbon monoxide, oxides of nitrogen, and aldehydes are present in hazardous amounts in Diesel-engine exhaust gas, they are not finally discharged into the general mine air in harmful concentrations, nor do they exceed the tolerance limits set by state and other governmental regulations except in a few instances, which were easily corrected. These results were of paramount importance to our company because they definitely involved the health and well being of the employees underground. Furthermore, lowering the temperature of the final exhaust gases and removing soot add to and maintain the comfort of the workers.

We are convinced that a Diesel locomotive can be operated with safety in underground operations and that a conditioner is definitely a desirable addition to the engine. We believe now that the amount of irritating gases being discharged into the mine atmosphere will remain nearly constant provided the engine is properly serviced and inspected.

In conclusion, we are satisfied with the economy and safety of the operation of the Diesel locomotive. We believe that no fire hazard of any moment is present, and a great improvement in mine ventilation will automatically result when Diesel locomotives are installed underground, maintained in proper mechanical condition, and atmospheric conditions provided as specified in this paper.

LEFT: J. M. Nolte, Dean of University Extension, University of Minnesota, organizes and conducts the annual Mining Symposium. CENTER: Jovial chairman of the opening session of the Symposium was Dan S. Young, chief mining engineer, Oglebay Norton & Company. RIGHT: Forbes B. Cronk, retired general mining engineer, Oliver Iron Mining Company, told the AIME meeting of iron ore developments in Venezuela and of U. S. Steel's Cerro Bolivar deposit.

PELLETS, WATER, AND RESERVES CONCERN OF MINNESOTA MEETINGS

Subjects which have a direct and immediate bearing upon the utilization of taconite made up almost the entire programs of the Minnesota AIME and the Twelfth Annual Mining Symposium of the University of Minnesota. The Minnesota Section of the American Institute of Mining and Metallurgical Engineers held its annual meeting at Duluth on January 15, and it was followed by two days of Symposium meetings. Over 300 mining people from the Lake Superior region were in attendance.

Sessions were based on the premise that taconite can and must soon become a major source of blast furnace feed. The few remaining problems barring attainment of the goal are, admittedly, large ones; but delegates seemed to accept these problems as personal challenges.

History and the development of pelletizing, drilling and blasting of hard materials, available water and its conservation and allocation, and competing foreign sources of iron had a direct bearing on the overall subject. Papers on the ever-popular subjects of depletion, aeromagnetic surveys, and electric power rounded out the programs.

Pellets, little round balls, held the attention of the group for one full day. During the past six years, pellets have probably received more concentrated attention from more sources than any other single item in the history of mining, with good reason. Many experts regard the pellet as the correct answer to the problem of converting the fine taconite concentrate to a coarse material suitable for blast furnace feed.

No one at the meetings expressed a doubt that it would be done. The discussion revolved around the method.

University Contribution Large

A long, detailed report by Edward W. Davis and Henry H. Wade, director and assistant director, respectively, Mines Experiment Station, University of Minnesota, served as the foundation for the discussions. Operators who are currently attempting pelletization contributed their field findings, and S. R. B. Cooke, professor of metallurgy and mineral dressing at the university, reported on the structure of taconite pellets and the effect of firing on this structure. His report was based on microscopic studies.

Work reported by the university, as well as by the operators, was not confined to taconite. It covered magnetite, hematite and even touched on certain non-ferrous materials.

Methods employed by the university and by commercial operators, so far, are nearly parallel. The university flow sheet describes them rather well.

Fine iron concentrate, at about 10 percent moisture, is filtered and delivered by conveyor belt to the balling drum, which is a 3 by 6-foot steel cylinder that revolves and looks much like a tiny rotary kiln. It has a scraping bar to clean the wall. Coal, if used, is added to the slurry ahead of the filter, thus insuring thorough mixing with the concentrate.

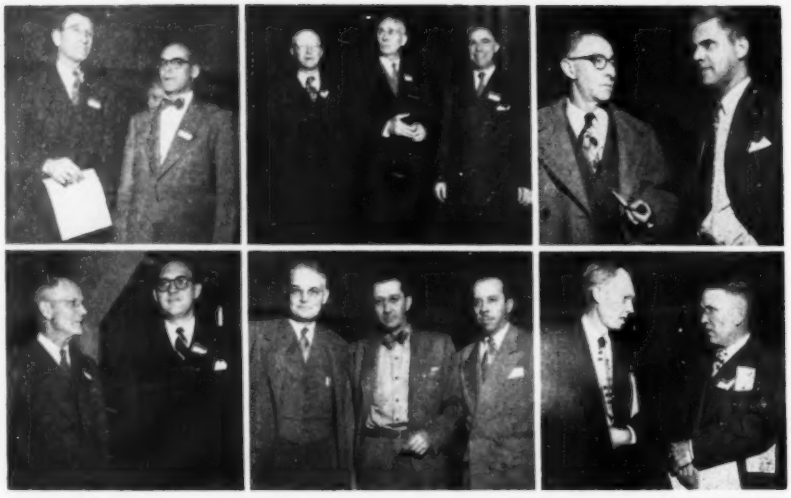
Balls are discharged onto a vibrating screen of desired mesh, usually ¾-inch, with the undersize returning, over a pair of conveyors, to the feed end of the balling drum. Oversized balls are conveyed to the furnace and distributed over the surface of the roaster area by a swinging boom conveyor.

Furnace Design and Operation

The furnace can be any one of several types, and the university has experimented with a number. No appreciable difference in final product was noted when the firing method was changed. All furnaces were of the "vertical column" type. Some were heated with combustion chambers; some were internally heated. The latter seems to offer certain advantages, especially on magnetites where the transformation to hematite is sufficient to sustain oxidation. In all the furnaces ore is fed in at the top, and air is introduced at the bottom.

In the internal combusion type furnace, sufficient coal is mixed with the concentrate to support combustion. With magnetite ore (including magnetic taconite) only enough coal is required to evaporate the contained water of the pellet. The water averages 10 percent, hence only a small amount of coal is needed—25 to 30 pounds per long ton.

To bring the initial charge to firing temperature, the cooling portion of the column is filled with sintered balls, stone or some other material that will allow free passage of air. Then a layer of wet balls is laid on top and brought to a bright red glow with a gas burner and blower applied from the top of the column. This layer is then covered with a thin layer of previously dried pellets and the wet balls are introduced on top. Then, the introduction of air from the bottom keeps the firing progressing. Control of the process rests with controlling the volume of air admitted.



TOP LEFT (left to right): Grover Holt, manager of Minnesota iron mines for the Cleveland-Cliffs Iron Company, is the new chairman-elect of the Minnesota Section of the AIME; M. W. Matheson, Jr., one of the newly elected vice chairmen. TOP CENTER: George M. Schwartz, professor of geology and mineralogy, University of Minnesota, and director of the Minnesota Geological Survey; Charles J. O'Connell, chairman of the Minnesota section, AIME; and V. N. Burnhart, acting secretary of the Minnesota chapter, were active in the annual program of the organization. TOP RIGHT: Among the metallurgists were Fred D. De Vaney, Erie Mining Company, and Louis J. Erck, Cleveland-Cliffs Iron Company. BOTTOM LEFT: J. F. Wolff, chairman of the program committee, poses with the Pickands Mather & Company attorney from Cleveland, Keith S. Benson, who spoke on depletion. BOTTOM CENTER: Kenneth Duncan, assistant manager of Pickands Mather & Company; Richard Belliveau, Cleveland-Cliffs Iron Company, and Bob Cannon, Paul G. Van Sickle Corp. BOTTOM RIGHT: A. H. Pedler, Minerals Separation North American Corporation, chats with John F. Linden of Interstate Iron Company.

Clinkering a Headache

Proper introduction of the feed is of paramount importance. The wet balls must be distributed across the surface in a sufficiently uniform manner that they will not roll. When hills and valleys develop, small sized balls stay on the peaks and large ones roll into the valleys. This arrangement of pellets will not change as the feed progresses downward, and vertical columns of different sized materials develop in the furnace. Air passage is rapid through the columns of large balls and slow through the small balls. Unsatisfactory firing, with wide variation in the final product, results.

Under certain conditions, balls will fuse and stick together to form masses or clinkers. A device to break these up or eject them from the furnace is necessary. While this problem seems to be a mechanical one, no completely satisfactory equipment has yet been developed. Several things will cause this clinkering. Most common causes seem to be over-firing and the addition of too much coal to the pellets.

Strong balls are necessary and testing methods have been devised. Wet balls are easily tested by dropping them about two feet onto a wooden floor. If they stand the drop, they will stand the firing furnace.

Fired pellets are given drop tests or individual compression tests. The university feels that dropping fifty pounds a distance of 33 feet three to six times and screening the final product gives a good indication of the ability to withstand handling and shipment. Bernard Larpenter, metallurgist at Bethlehem Steel Company's testing plant at Lebanon, Pennsylvania, prefers compression tests on individual pellets.

The addition of certain materials to the balls increases their strength. Starch, bentonite and sodium silicate all seem to increase wet strength slightly and the dry strength considerably. Bethlehem uses bentonite in its pellets and feels that satisfactory wet strength cannot be obtained without it.

Probably the most satisfying statements came as a result of large scale tests of pellets in blast furnace operation. All reported that a marked saving in coke and air resulted and that capacity of the furnace was increased in direct ratio to the increased grade of the product fed. Bethlehem also reported that less limestone was needed to treat its pellets which are made from magnetite fines.

Iron for the Future

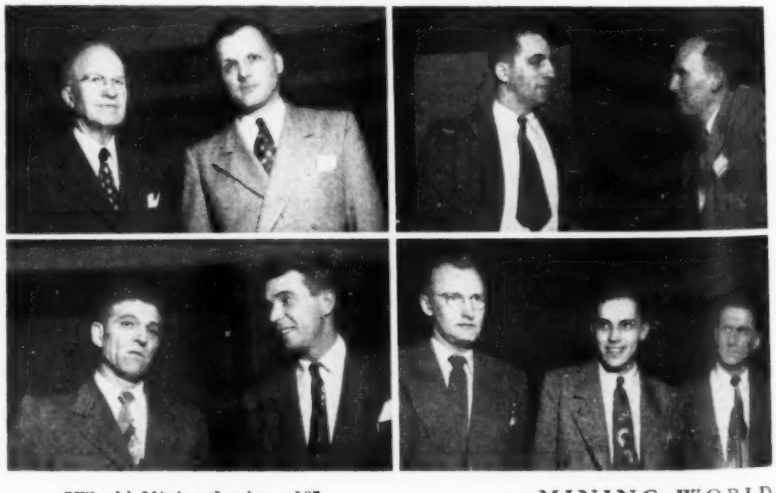
"In the future, it will be necessary to obtain a greater percentage of iron ore requirements from imports," R. H. B. (Davey) Jones, geologist, Oliver Iron Mining Company, told the AIME delegates. "In the final analysis, it will become not a matter of the source of the ore, but, rather, competition between sources," he said at the conclusion of his remarks.

Much Discussed Bolivar

Forbes B. Cronk, retired general mining engineer, Oliver Iron Mining Company, kept the group fascinated with his account of the discovery and planned development of Cerro Bolivar.

In addition to the usual development of a large-scale openpit mine, Orinoco Mining Company (a U. S. Steel Corporation subsidiary) must provide housing, power, lights, main line railroad, port facilities and a fleet of ocean-going ore carriers.

TOP LEFT: E. E. Hunner and R. O. Buck, both of the M. A. Hanna Company. TOP RIGHT: A couple of happy delegates were Hugh Leach, Cleveland-Cliffs Iron Company, and Don Berkner, Oliver Mining Company. BOTTOM LEFT: Oliver Iron's long list of delegates included P. Del Grece and Charles Pohorney. BOTTOM RIGHT: More of the Oliver personnel: L. A. Danielson, T. O. Olsen, and V. R. Huff.



Vermillion Range Findings

In his report of areomagnetic surveying of the Vermillion Range, Dr. George M. Schwartz, director, Minnesota Geological Survey, told of indications that may lead to development of additional ore reserves in the east end of the range.

Water Needs Told

To the casual observer a discussion of a water shortage and the need for long range planning and allocation of water supplies in the "Land of 10,000 Lakes" sounds a little ludicrous, especially when one of the 10,000 lakes is Lake Superior. However, a careful examination of the requirements of a large scale taconite processing industry compared to the available supply shows good reason for thought and concern.

Discussion of the subject by Dr. Schwartz; Chester S. Wilson, commissioner of conservation, state of Minnesota; Paul R. Speer, district engineer, U. S. G. S.; and others, brought out the point that Lake Superior could supply all water and absorb all tailings by all taconite-processing presently envisioned. However, economics make erection of all of the plants on the shore of the lake impractical, and, therefore, other water supplies must receive consideration.

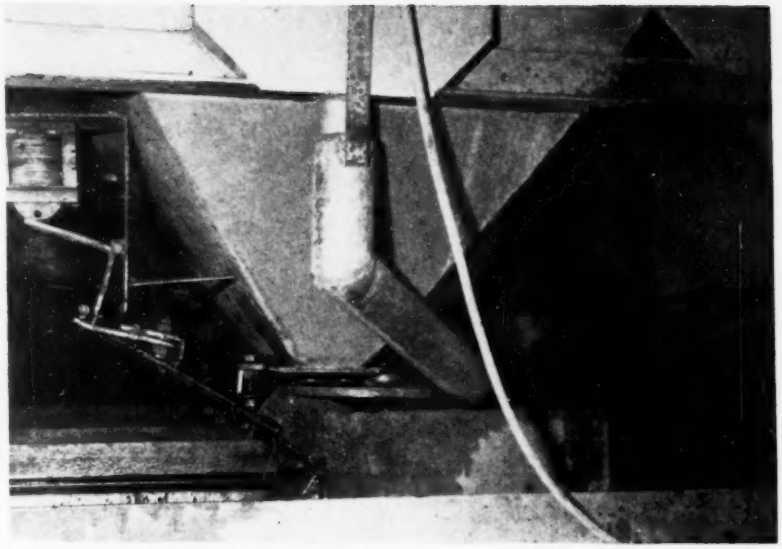
In addition to the requirements of the beneficiation plants, additional domestic water will be needed by the extra population necessitated by the industry. Estimates place the need in the neighborhood of 100,000 acre feet (326,000,000,000 gallons) annually.

Breaking Hard Rock

Mesabi hematites are reasonably soft, easy to break and dig. So, with the necessity of handling taconite just around the corner, operators are becoming concerned over maximum economy in drilling and blasting. Richard M. Belliveau, district superintendent, Cleveland-Cliffs Iron Company, presented his views on the subject.

While he failed to obtain complete agreement among his listeners, he made a strong case for closer spacing of holes, loading with deck as well as toe charges and drilling not more than two to four feet below grade. The practices he recommended have, in general, worked quite successfully on the hard copper orebodies of the West.

The meetings showed clearly that the iron producers have their problems, that they recognize the problems and are taking steps to solve them.



Loss of valuable ferrosilicon in the event of power failure at the magnetic separator in a heavy-media separation plant is prevented by this simple automatic, baffle, electro-magnet and linkage mechanism.

AUTOMATIC MEDIA SAVER

Loss of ferrosilicon in the event of power failure at the magnetic separators in the medium cleaning circuit of Pacific Isle Mining Company's South Uno heavy-media separation plant near Hibbing, Minnesota, has been eliminated by a simple, inexpensive and effective device. Substantial ferrosilicon losses have resulted when failure of the motor generator set cut off the power supply to the magnets, but the HMS circuit continued to operate. Dirty and diluted medium passed through the cleaning circuit and right on out to waste, carrying the valuable ferrosilicon with it. This happened once at the Uno plant before a remedy was developed.

Pacific Isle Solves Problem

It was known that some HMS plants had devised controls to eliminate this loss, but different conditions made it necessary for Pacific Isle to design its own. The device, as installed, is the result of collaboration between company electrician, Bob Stevens, and a former staff member, Jack Durham.

The device is quite simple. A short piece of metal launder is hinged below the tailings draw-off on the magnetic separator. A series of rods reaching from the launder to the electro-magnet hold the chute in the "normal" position in such a way that tailings flow into the waste sump.

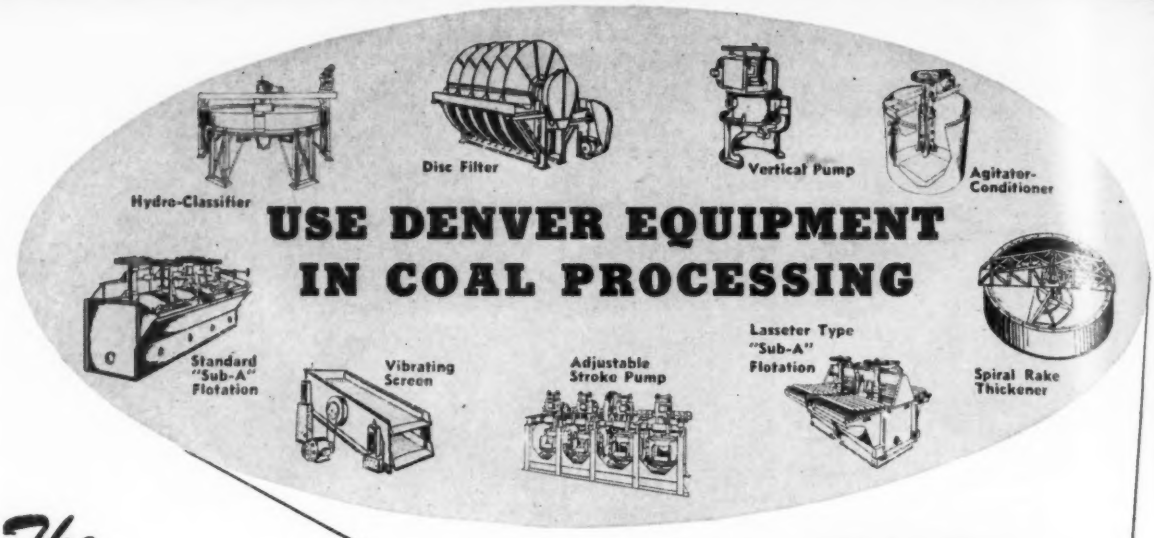
Current for the electro-magnet is supplied from a 110-volt source through a contact held in position by a coil connected in series with the magnet banks of the separators. This type of circuit, instead of one direct from the motor generator set, was necessary because of the limited direct current capacity.

Automatic Operation

When power fails at the separators, it also fails at the electro-magnet and permits the short launder to drop into position and divert the flow of medium to the clean-up sump. From the clean-up sump it can be pumped back to the washing screens and returned to the magnetic separators.

The accompanying photograph shows the lower part of one of the Dings, Hi-Intensity, wet separators used in the Pacific Isle medium cleaning circuit. Tailings normally discharge through the square sheet metal sump. The hinged launder can be seen directly under the spout at the upper left of this sump. The electro-magnet holding it in the "normal" position is located directly below the supporting bed of the machine at the left of the spout. When the direct current to the electro-magnet is cut off, the left end of the launder drops, diverting the flow of tailings from the Dings away from the waste sump and into the clean-up sump.

According to John Boentje, plant superintendent, "Once the gadget was developed, it really worked, and was almost as simple as this description."



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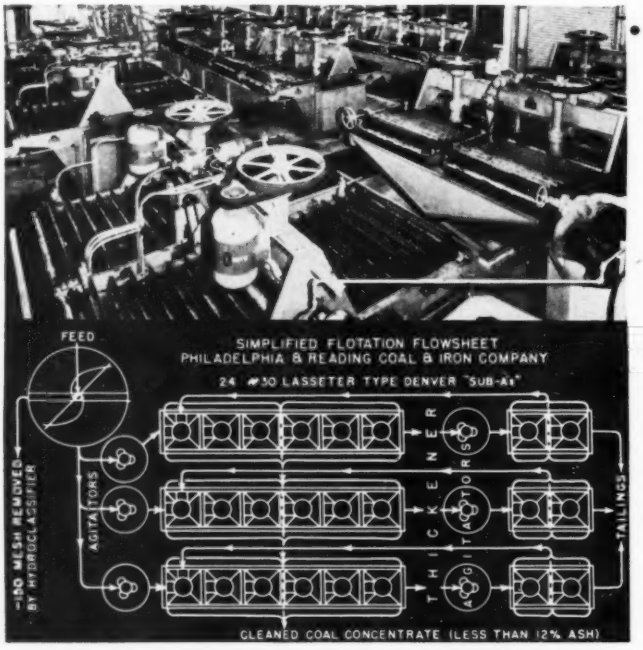
The PHILADELPHIA & READING COAL & IRON CO. *Uses*

DENVER "SUB-A" (Lasseter Type) FLOTATION



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Particle Size: Minus 10 mesh to plus 200 mesh.

Tonnage: 150 TPH initial feed.

Flotation Cells: 24 No. 30 (Lasseter type) Denver "Sub-A" Cells.

Flotation Feed: Ninety tons per hour (minus 150 mesh removed from original feed).

Flotation Concentrate: Sixty tons per hour. (One ton per minute.)

Ash Content: Less than 12 per cent.

Reagent Cost: Less than 15 cents per ton feed.

Hear this Story AT A. I. M. E.

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This complete story will be told at the February 1951 A.I.M.E. meeting in St. Louis by Mr. H. R. Hagen of the Philadelphia and Reading Coal and Iron Company . . . and will be printed with details and pictures soon in Deco Trefoil.

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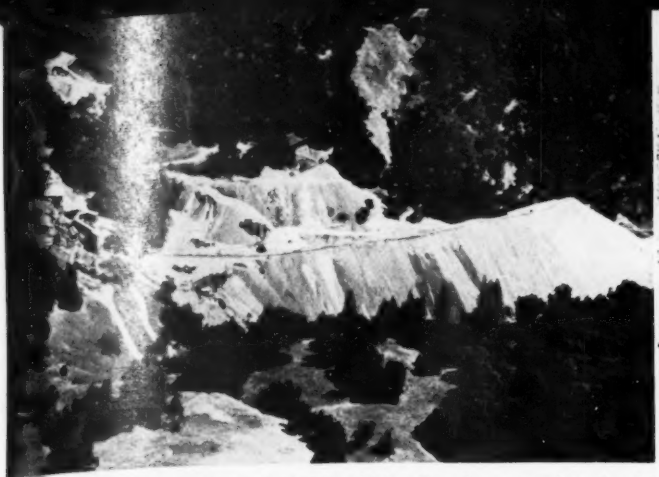


LEFT: Viewed from the air, the 100-foot-high tailing dump extends to the right from the furnacing plant at the Mt. Jackson mine. The Mt. Jackson adit is just to the left of the furnacing plant. **RIGHT:** This is a view of furnace No. 1, an 85-ton Gould rotary. Ore coming from the portal (just above the crushing plant on the left) is crushed to 1¼ inches, then charged to the furnace on the right. The condensing system consists of condensing towers, three condensing tanks just in front of the towers, and a wooden duct and stack.

CALIFORNIA'S MT. JACKSON MINE

Though not the largest domestic mercury mine, the Mt. Jackson on Russian River shows a profit at prices under which only the fittest can survive

In California, where mercury was first discovered and produced in the United States and which usually produces approximately 90 percent of the United States domestic mercury, only one producer of consequence remains. Sonoma Quicksilver Mines, Inc., is mining and furnacing cinnabar ore at its Mt. Jackson mine, three miles northeast of Guerneville, California.

These factors enable Mt. Jackson to produce under market conditions which have eliminated not only smaller operators, but also larger operators: The hard ore-bearing formations of the underground mine stand well without timbering; the furnacing plant is a modern (1940 and later) installation of two Gould rotary furnaces (in the simple flowsheet crushed ore is fed directly to the furnaces); the average tenor of ore, approximately eight pounds per ton, can be maintained even under a capacity production of approximately 140 tons per day.

Managing Sonoma Quicksilver Mines, Inc., are President H. D. Tudor, Vice President and Manager E. F. Halloran, Superintendent Allen G. Mowry, and Mill Superintendent Herbert F. Larson.

Needed: More Miners

Sonoma Quicksilver Mines, Inc., acquired the Mt. Jackson mine in 1940. The company redeveloped the mine, drove a short adit into the mountainside, and sank a new vertical winze for ore hoisting. A Gould 85-ton rotary furnace and condensing plant was erected to process the ore, and since then a new 55-ton furnace has been added to the plant.

Today Mt. Jackson is concentrating the efforts of its 40 to 50 men on development and exploration. The hoisting winze is being sunk an additional 100 feet to approximately 900 feet of total depth. When the new horizon of ore has been developed, production will be boosted to its 1949 level of 3,500 flasks yearly. If men were available the miners needed in stopes would not have been diverted to development work, but Mt. Jackson, like nearly all strategic-metal producers in this country, needs more miners now.

Shrinkage Stoping Saves Timber

Mt. Jackson ore occurs as cinnabar disseminated through Franciscan sandstone and flinty opalite at their contact with serpentine. The hard, unfractured host rock, though it is hard to break and crush, eliminates the need for permanent timbering except in the winze and in chutes and manways. Miners work the orebody by shrinkage stoping under a firm, timber-free back; some stopes are as big as 150 feet by 30 feet. Ore cars are caged, hoisted and trammed through the adit to the primary-storage bin at the crushing plant.

In the crushing plant, screened ore is crushed by a Straub Manufacturing Company "Kue-Ken" jaw crusher set at 1¼ inches. Because of the unusually tough crushing job, an identical "Kue-Ken" is held as a standby.

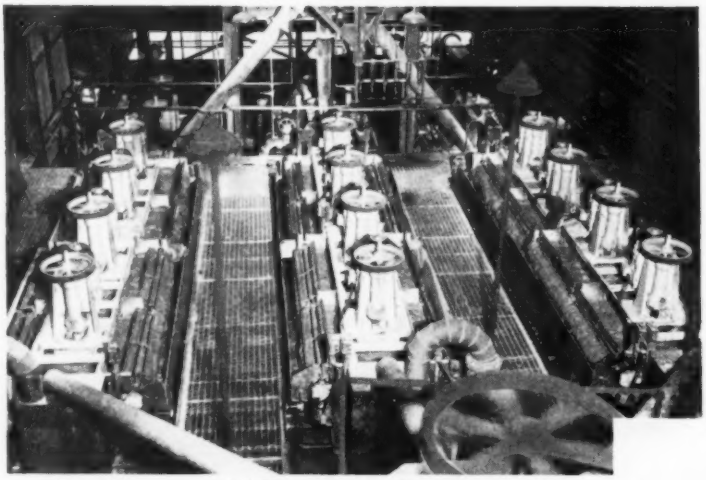
Fired by 16-gravity oil, the two Gould rotary furnaces in parallel almost completely vaporize the contained mercury in the ore—extraction is nearly 100 percent. By keeping the furnaces at less than atmospheric pressure, an exhaust fan between the furnaces and the condensing towers practically eliminates leakage of mercury vapor into the atmosphere. Mercury vapor, passing through the condensing towers, is condensed to metallic mercury which is trapped in a water bath.

Petroleum in Sub-Sea Stopes

The Mt. Jackson mine is unusual not only in being able to operate profitably today, but also in two other respects: The lower levels of the mine are roughly 450 feet below sea level at a point only 18 miles from the Pacific Ocean, but no water trouble results from the condition; crude oil oozing from the surface of workings and natural gas leaking into the air create ventilation problem. In its own way, Mt. Jackson vies with Rifle, Colorado, for the title of "Premier Oil Mine of the United States."

Efficient, well developed, well managed and, fortunately, free from the high timbering costs of other mercury mines, Mt. Jackson is the only operating mercury mine now of consequence in our greatest mercury-producing state. Mt. Jackson's 1949 production of 3,500 flasks (and that is the mine's approximate potential today) still represents only one-tenth of California's peak wartime production of 33,948 flasks in 1943.

ANOTHER CASE OF RESULTS WITH FAGERGREN FLOTATION MACHINES!



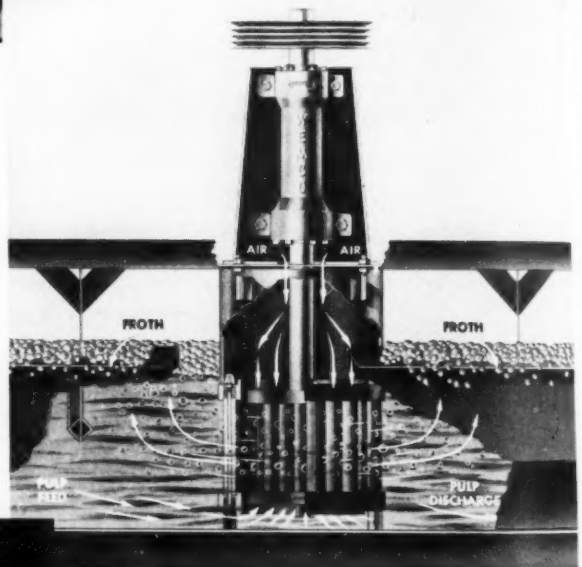
Typical Fagergren installation at American Cyanamid Co. Sydney mine at Brewster, Florida, floating phosphates.

- Zinc concentrate grade up from 57% to 60%.
- Rougher tailings reduced from 2.5% to 0.6% zinc.
- Horsepower and reagent consumption lowered.

Typical of many installations where Fagergrens are used as both roughers and cleaners, these outstanding results were recently reported by a prominent zinc producer. A conversion from another make machine to Fagergrens provided convincing proof of Fagergren superiority in roughing and cleaning.

HIGH METALLURGICAL EFFICIENCY is a direct result of the thorough dispersion of air achieved by the Fagergren rotor-stator design, which together with simple, rugged construction brings these important advantages to operators throughout the world:

- High mineral recovery.
- Minimum reagent consumption.
- Low power consumption.
- High capacity per foot of cell volume.
- Minimum maintenance expense.



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PROMINENT MEN IN INTERNATIONAL MINING

Frank E. Noe, metallurgical engineer in charge of the mining mission sent to Mexico by the U. S. Bureau of Mines, said the United States will provide "the most aid possible to develop Mexican mining production and to cooperate with owners of small mines and workings." Noe replaces *Alan Probert* who has left Mexico for Washington, D. C., to become assistant director of foreign mining regions in the Bureau and administrator of the U. S.-Mexican program of mining cooperation.

R. G. McEachern has been appointed assistant to *C. O. Swanson*, chief geologist for The Consolidated Mining and Smelting Company of Canada at Trail, British Columbia, and Swanson has named *W. T. Irvine* as senior mine geologist to take McEachern's place. The latter is a graduate of the University of B. C. and joined Cominco's staff at the Sullivan mine in 1942. Irvine also is a graduate of that University and joined Cominco in 1946.

G. A. Gordon has resigned as manager of the Cariboo Gold Quartz Mining Company and will leave when a successor has been named. He has not revealed his plans for the future.

ARTHUR C. BIGLEY, left, former general superintendent of mines for Anaconda Copper Mining Company, Butte, Montana, has been appointed manager of mines. He has been succeeded by Edward J. Renouard, Jr., former assistant general superintendent of mines. Bigley, employed by Anaconda for 37 years, succeeds H. J. RAHILLY, right, who has been transferred to the company's mining department at New York. Rahilly has been employed by Anaconda since 1917. Other company changes include the appointment of T. Charles Wise to assistant general superintendent and of Vic O'Leary to superintendent of the Mountain Con mine. One retirement reported by the company is that of M. O. Scott, assistant purchasing agent for 10 years.

Freeman H. Dyke has resigned as general manager of Acero del Pacifico, Talcahuano, Chile, to become manager of the United States Metals Refining Company at Carteret, New Jersey, succeeding *L. E. Cole*. The company's parent organization, the American Metal Company, Ltd., announced that Cole has been promoted to consultant on copper smelting and refining problems and will make his headquarters at American Metals' New York office.

E. Sengier and *J. Cousin* of the Union Miniere du Haut Katanga were relieved, by request, from their managing directors' duties—Sengier at Brussels and Cousin at Elizabethville—and Sengier was instead named president of the Permanent Committee of the company while Cousin was made president of the Local Committee at Katanga, Belgian Congo. Appointed as managing directors were *H. Robiliart* and *A. Marthoz*, the former to work in Europe and the latter in Africa. *R. Terwagne*, a director and manager, will assist Robiliart. *Mr. Wallef* will be manager at Brussels with several trips a year to Katanga as representative of the board. General manager in Africa will be *Mr. Van Weyenbergh*.

Almany (Big Chief) Ibrahima Sory, spiritual and temporal leader of natives in the Fouta-Djallon section of French Guinea, has been appointed to the board of directors of the Conakry Mining Company. The company is undergoing expansion to raise iron ore output to 500,000 tons by the end of next year and is building two villages to house 600 native workmen most of whom are subjects of Sory.

Charles E. Basso has returned to the U.S.A. from Bolivia where he worked for the Cia. Minera Unificada del Cerro de Potasi as chief engineer. He is now living at Reno, Nevada, until he finds another foreign assignment.

Jenaro Gonzalez Reyna is leading a brigade of Mexican government engineers on a survey of mining resources in the State of Oaxaca, Mexico. The surveying party, composed of engineers *Egardo Meave*, *Ruben Porras*, *Ricardo Wiggin*, *Guillermo Sbovoda*, *Pedro Hernandez*

R. McLEAN STEWART, who recently was elected a director of Cerro de Pasco Copper Corporation, has been on a several week visit to the company's property in Peru. His headquarters are at 40 Wall Street, New York, and he also is a director of Union Sulphur and Oil Corporation and a general partner of William A. M. Burden & Company, a capital investment firm.

Macedo, *Federico Rendon*, *Jesus Ojeda Rivera* and *Victor S. Rocha*, will examine the mining possibilities of the central regions of the state, the Mixes and Ejutla zones and the southern part of Miahuatlan.

Joel B. Pomerene and *Garn A. Rynearson* of the U. S. Geological Survey have gone to Belo Horizonte, Minas Gerais, Brazil, to conduct investigations of the high grade iron ore and manganese deposits and to do topographic mapping. They are two of six Geological Survey geologists who will be sent to Brazilian iron regions through a 10-year minerals investigation program the U.S. has in cooperation with the Brazilian government.

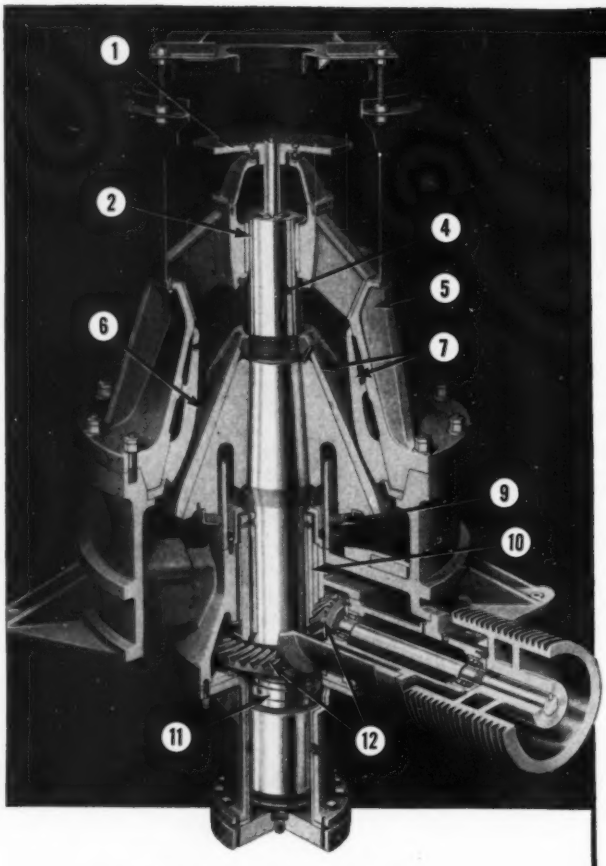
John G. Munson, since 1939 vice president, Raw Materials, United States Steel Corporation of Delaware, has retired but will continue to serve the company in an advisory capacity.

Hon. George Prudham has been appointed Minister of Mines and Technical Surveys in Canada. He formerly was Parliamentary assistant to the Minister of Resources and Development.

Frank M. Estes of Memphis, Tennessee, U.S.A., is in Indonesia investigating mineral deposits and the economic situation in regard to mining there.

Frank S. Wada of the Taihei Mining Company in Japan, acted as spokesman for six other Japanese mining men who studied mining methods in the U. S. for two months recently. Others of the group were *K. Obubo* also of Taihei; *S. Imai*, Nittesu Mining Company; *T. Katsuki*, Furukawa Mining Company; *Y. Haratsuka*, Bureau of Mines; *E. Nomura*, Nippon Mining Company;

HYDROCONE Crusher Gives You All These Benefits



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3 **FULLY AUTOMATIC** lubricating and oil conditioning system.

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5 **TOP SHELL AND SPIDER** cast in one piece. Can be easily removed.

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9 **ENCLOSED RING TYPE DUST SEAL** — A plastic ring impregnated with lubricant and held in place by a retaining ring. Dust is sealed from crusher eccentric by contact of the plastic ring with the outer periphery of the dust collar.

10 **BRONZE ECCENTRIC SLEEVE** is easily changeable in the field. Various eccentric throws may be obtained through the use of different sleeves, adding to the versatility of the *Hydrocone* crusher.

11 **THREE-PIECE** step bearing supports the main shaft on the hydraulic piston. *Hydrocone* crushers are designed to withstand crushing pressures much greater than those encountered in actual service.

12 **BEVEL PINION AND GEAR** are accurately cut . . . provide smooth operation and long life. Spiral bevel gears on the larger crushers.

AND — MOST IMPORTANT — *Hydrocone* crusher offers you *hydraulic control* of product size! Push-button operation on larger crushers; hand crank adjustment on smaller machines. An Automatic Reset protects crusher from tramp iron.

Capacities 10 to 1000 tph; sizes up to 84-in. diameter cone. For more facts, contact the A-C representative in your area, or write Allis-Chalmers, Milwaukee 1, Wis., for Bulletin 07B7145B.

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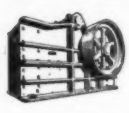
Jaw Crushers


Kilns, Coolers, Dryers

and *S. Nakabe*, Besshi Mining Company.

H. F. Kenward, managing director of Hamil Silver Lead Mines, Ainsworth, British Columbia, announces the appointment of *J. R. Hanlon* as mine superintendent. Hanlon was formerly superintendent of the Surf Inlet mine on Princess Royal Island and he was subsequently consultant to Hollinger Gold Mines.

Willis McGerald Peirce, assistant to the general manager of the technical department of the New Jersey Zinc Company, Palmerton, Pennsylvania, has been elected president of the American Institute of Mining and Metallurgical Engineers for 1951. *Joseph L. Gillson* and *Michael L. Haider* were named vice presidents and directors. Gillson is geologist with E. I. du Pont de Nemours & Company, Wilmington, Delaware. Haider is vice president and general manager of Imperial Oil Ltd.'s production department. Six new directors have been elected: *Thomas Gaunt Moore* of the American Metal Company Ltd., New York; *Charles E. Lawall*, Chesapeake & Ohio Railway, Huntington, West Virginia; *John F. Myers*, Tennessee Copper Company, Copperhill, Tennessee; *Fay W. Libbey*, Oregon State Department of Geology & Mineral Industries, Portland; *Albert C. Rubel*, Union Oil Company of California, Los Angeles; and *Leo F. Reinartz*, Armco Steel Corporation, Middletown, Ohio.

Oscar A. Glaeser has been named assistant to the vice president and general manager of western operations of the United States Smelting, Refining and Mining Company at Salt Lake City, Utah, and *B. E. Grant* has been made assistant manager of western mines. Glaeser had been industrial relations engineer and *M. A. Kuryla* will succeed him in that position.

Dr. Thomas S. Lovering of the U. S. Geological Survey has become acting president of the Geological Society of American following the recent death of *Dr. Chester Stock*, California Institute of Technology.

Robert Gregg has retired as president of the Tennessee Coal, Iron and Railroad Company, Birmingham, Alabama and has been succeeded by *Arthur V. Wiebel*, formerly vice president in charge of operations. Mr. Wiebel will be succeeded by *J. M. Spearman*, who advances from the position of manager of manufacturing operations.

Clyde E. Weed, vice president in charge of mining operations of Anaconda Copper Mining Company, will receive the 1951 William Lawrence Saunders medal for distinguished achievement in mining. The medal will be presented to him at the AIME's annual banquet at St. Louis on February 21, 1951.

Lute J. Parkinson, mining consultant, received the Colorado School of Mines Distinguished Achievement Award December 15th at Denver, Colorado. A Mines graduate in 1923, Parkinson has spent 20 years working in Central and South Africa and six years in South America, the last five as mining consultant for the Anglo-Chilian Nitrate Corporation and the Lautaro Nitrate Company, Ltd. at Antofagasta, Chile.

Norman Weiss, milling engineer for the American Smelting and Refining Company at Salt Lake City, Utah, recently returned from a trip to South America.

Karl H. Koropp has been appointed assistant superintendent of the electrolytic refinery at Garfield, Utah, of the Kennecott Copper Corporation. He had been in charge of the Cerro de Pasco Copper Corporation refinery in Peru. Other Kennecott appointments include that of *S. W. (Sim) Smith* to mine superintendent, openpit mining, at Ruth, Nevada, and of *R. C. Nispel* as his assistant.

If you mine or contemplate mining any of the above non-metallic or metallic oxide minerals, these simple facts are important to you:

1. Every last ton of these vital industrial minerals will undoubtedly be needed in the difficult days ahead.
2. Grade as well as tonnage will be important for defense-order needs.
3. Quickly, at low capital-cost, many properties can increase output; cut costs by less-selective mining; work deposits now considered to be sub-marginal; and ship higher-grade end-products by adding Processes and Reagents offered by Cyanamid.
4. A very considerable background of test results, design data and operating experience now exists on a long list of non-metallics to assure predictable performance in minimum time at lowest cost.
5. It is not one day too early to find out what Cyanamid can do to help you operate more efficiently into the future.

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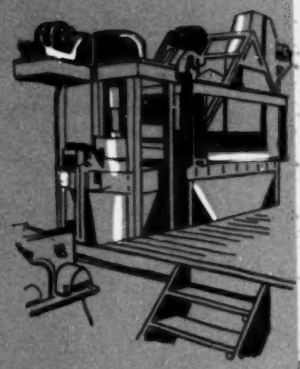
WHAT CYANAMID OFFERS YOU

Cyanamid offers the two most efficient Separation Processes by Gravity Difference (Heavy-Media Separation and the Dutch State Mines Cyclone Separator) as well as a group of effective Specialized Reagents and Processes for Non-Metallic Froth Flotation. Alone or in combination, these Processes and Reagents are beneficiating thousands of tons per day in plants as small as 8 tons per hour and as large as 20,000 tons per day.

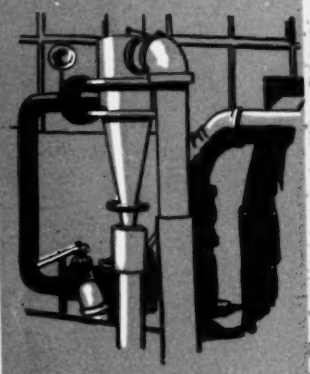
Cyanamid also offers, after preliminary discussion of your problem without cost or obligation, to run tests on your material in the Cyanamid Mineral Dressing Laboratory; to develop economic beneficiation flow schemes; to suggest proper reagent combinations; to cooperate with engineers of your choice in the design and construction of plants and to assist in tuning up the installation for most effective results.



WHAT HEAVY-MEDIA SEPARATION DOES

Heavy-Media Separation accurately separates valuable mineral from unwanted deleterious material in sizes down to 30 mesh by virtue of their differences in specific gravity. You set the gravity of the Heavy-Media "pool" at any gravity from 1.25 to 3.40 to get the separation you want. From then on, the Heavy-Media unit maintains that gravity within ± 0.01; automatically recovers and reconditions the medium, and feeds it back to the separating pool. On many minerals, you can mine non-selectively by the most economical method with assurance that the Heavy-Media unit will produce a uniform end-product, regardless of how feed fluctuates in quantity or content of unwanted material.

As Technical and Sales Representatives for Heavy-Media Separation Processes, we do not design, build or lease plants but can put you in touch with experienced engineering construction firms who do including those who can make speedy delivery of pre-fabricated "packaged plants" in capacities up to 300 tons per hour.



THE DUTCH STATE MINES CYCLONE SEPARATOR

This unique separation process is particularly applicable to the low cost separation of ¼" x 65 mesh and finer sizes. Employing a unique application of centrifugal and centripetal forces, the Dutch State Mines Cyclone Separator merits study (a) as a low-cost method of pre-concentrating where the feed contains only a small percentage of high-value minerals, (b) to produce a directly-marketable mineral concentrate from fine material, (c) to treat feeds which are inherently not amenable to jig or table treatment, or cannot be economically concentrated by froth flotation.

CYANAMID FROTH FLOTATION REAGENTS AND PROCESSES

Froth flotation is by far the most widely-used process for the beneficiation of fine material and as the final step in the treatment of feed that has been pre-concentrated by mechanical methods. In many instances, it has no peer and its use is constantly being expanded by the development of improved processes and reagents.

With the world's longest and broadest experience in the development and application of flotation reagents, Cyanamid offers the 800 Series, 700 Series, Oleic and other Fatty Acid Promoters, and Higher Alcohol Frothers, as well as Processes for their effective use. We welcome correspondence on these reagents and will gladly give you the benefit of our extensive experience in non-metallic flotation.

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First step to more efficient, profitable operation is to send for the booklets listed below. The coupon is for your convenience.

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- ☐ MINERAL DRESSING NOTES #14, a 48-page technical booklet explaining *Heavy-Media Separation Processes*, showing flow schemes, plants and commercial operating results.
- ☐ MINERAL DRESSING NOTES #16D, describing in detail the *Dutch State Mines Cyclone Separator*.
- ☐ MINERAL DRESSING NOTES #15, describing *Cyanamid Flotation Reagents* and their fields of use.

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MINERAL DRESSING DIVISION

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INTERNATIONAL NEWS

Aluminum Output in U.S. To Be Increased 55%

In the past few weeks expansion and plant reactivation programs of the U. S. Government has raised to 399,000 tons yearly the aluminum contracted for by the government.

The Aluminum Company of America will expand facilities to provide an additional 120,000 tons a year by installing equipment in its Point Comfort, Texas, plant and at a new plant to be built at a still undetermined site, and by reopening its idle plants at Massena, New York, and Baden, North Carolina.

Harvey Machine Company, Inc., of California, and Apex Smelting and Refining Company of Illinois are planning production at new plants. Kaiser Aluminum & Chemical Corporation and Reynolds Metals Company will raise present capacity by 100,000 tons each.

Current U. S. output of aluminum is about 700,000 tons annually. The expansion projects will increase this output by about 55 percent.

ECA Aids French African Diamond Development

A new source of industrial diamonds may be developed in French Equatorial Africa through assistance of the Economic Cooperation Administration. It has advanced the equivalent of $400,000 in foreign currency counterpart funds to the Upper Sanga Diamond and Gold Company for exploration and development of diamond-bearing land along the eastern bank of the Sanga River between Nola and Ouesso, in the middle Congo and Oubanghi-Chari territories.

The company is a subsidiary of the Compagnie Miniere de l'Oubanghi Oriental (CMOO) which also operates in French Equatorial Africa and is developing its diamond fields with the aid of $500,000 and 385,-310,000 francs in Marshall Plan funds.

Two Iron Deposits May be Exploited in Mexico

Two new iron deposits may be developed in Mexico. Either federal aid or federal facilities for private exploitation was asked of President Miguel Aleman by Governor Jose Gonzalez Lugo of Colima for an iron deposit, estimated to contain from 80,000,000 to 100,000,000 tons of reportedly high grade ore, recently discovered at Minatitlan, Colima. Minatitlan is connected with Manzanillo, chief port of Colima, by a new 45-mile road, so that transportation problems at least would be reduced.

The second deposit is at Tepalcatepec in the Las Truchas district of Michoacan, where iron has been known to exist for some time. President Aleman is considering the suggestion of Ing. Adolfo Orive Alba, secretary of hydraulic resources, that the government undertake the exploitation of this deposit or assist private companies to do so.

As a recent announcement from Mexico City stated that iron and steel production would increase 25 percent in the next two years, the government may be favorably inclined to aid development of the two new discoveries.

Malaya Plans Highway And Mining Projects

Two projects are planned in Malaya which will make large tin deposits available for mining. One project involves the construction or improvement of 450 miles of highway at a cost of 22,000,000 Malayan dollars ($7,170,000 American dollars). The U. S. Economic Cooperation Administration will aid by contributing $410,000 worth of American tractors and road-building equipment. The new roads will benefit agriculture, permit the carrying out of internal security measures, and open up new sources of strategic materials, particularly tin.

The other project is that of the Penghalen, Limited, and Malay Tin Dredging, Ltd., to divert a section of the Kinta River in Perak State in order to reach tin deposits lying in the river channel. A total of 14 miles of river will be diverted by the companies through construction of five weirs. As bedrock is at shallow depths, dredges digging down only 75 to 100 feet will be able to recover the tin. When the project is finished, areas along the channel also will be available for mining.

Canadian Groups Ask for Liberal Gold Program

Several Canadian mining associations have asked their government to broaden its gold mine subsidy program for 1951.

The Ontario Mining Association asked that Canada join South Africa in asking for the removal of the fixed price of $35.00 an ounce for gold and for the privilege of individuals to own gold.

The Mining Association of British Columbia, the Midwest Metal Mining Association, the Canadian Metal Mining Association and the Western Quebec Mining Association asked that the depletion allowance on mine profits be increased; that the government's assistance program be liberalized; and that the government study a plan to market gold for industrial and artistic purposes or give the industry permission to sell a proportion of its product in a similar way—and thus obtain a more realistic price.

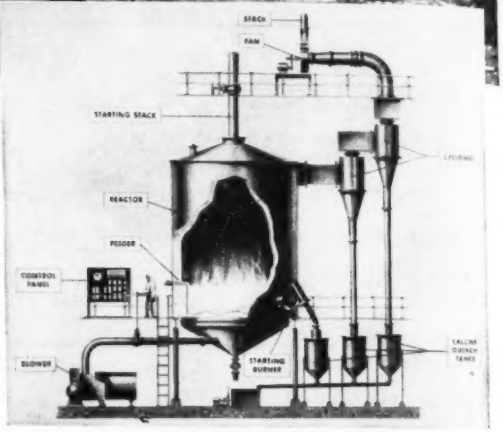
Since 1948 the Canadian government had been paying 50 percent of gold production costs over $16 an ounce and up to a maximum of $18 an ounce. During 1951 the maximum assistance payment will drop to $11.50 an ounce.

WEMCO Mobil-Mill to Be Sent to Australian Firm

A new coal preparation plant, to treat 330 long tons per hour, will go into operation at the Commonwealth mine of the N. S. W. Mining Company in Australia in 1951. The firm recently placed an order with Western Machinery Company, San Francisco, California, U.S.A., to design and furnish the new plant. It will include a No. 5C mobil-mill using a 14-foot diameter cone separator as the heavy media vessel.

Also included in the new installation is a heavy media feed preparation plant consisting of washing screens and a 54-inch diameter coal spiral; a water reclamation system incorporating a 55-foot diameter thickener; a media grinding plant used for the preparation of magnetite medium and consisting of a three-foot ball mill, 18-inch SH classifier, demagnetizing coil, feeder, bin and other components. All units

Another DORRCO FLUOSOLIDS SYSTEM for Canada's Red Lake district



Circled in the photo above is the FluoSolids building at Campbell Red Lake Mines Ltd. . . . another Dorrco FS System to be installed in Canada for the roasting of refractory arsenopyrite gold ores. With a design capacity of 65 tons per day, Campbell's FS System is roasting flotation concentrates for the elimination of arsenic and sulphur. The calcine is cyanided for gold recovery.

Three features of particular significance have been demonstrated at Campbell:

FIRST . . . the FS System is successfully roasting a concentrate containing only 18% sulphur . . . without auxiliary fuel.

SECOND . . . feed is being pumped to the FS Reactor as a slurry at 70 to 80% solids . . . without prior drying.

THIRD . . . it has been possible to shut down one shift per day with no difficulty experienced in returning to full operation.

Resultant low operating costs and low first cost as compared with conventional roasters make FluoSolids well worth careful investigation. If you have a roasting problem involving arsenopyrite or telluride gold ores we would like to give you further details.

DORRCO FLUOSOLIDS Systems employing single compartment reactors as illustrated are applicable to the roasting of refractory gold ore concentrates, copper and zinc concentrates, and pyrite.

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Dorr Technical Services and Equipment Are Also Available Through Associated Companies and Representatives in the Principal Cities of the World
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are prefabricated and designed by the company for rapid field assembly at the plant site.

Greek Mines Will Expand Lead-Zinc Operations

Mediterranean Mines, Inc., in Greece, has been rehabilitating and expanding operations at its mines near Athens since November, 1949, with Economic Cooperation Administration aid. At that time development of the Sounion-Aulaki-Vromopoussi mine was begun and a 200 ton per day concentrating plant installed. The capacity of this plant recently was increased to 250 tons daily.

Now further ECA funds will be advanced to expand operations at the Laurium silver-lead-zinc mines. ECA will contribute $102,193 plus 10,000,000 drachmae (about $666,000) in counterpart funds for the work. The firm will repay ECA with shipments of lead and zinc to the U. S. stockpile over a period of three years.

Headquarters of Mediterranean Mines are at New York.

Inco Starting Mine-to-Refinery Expansion

To meet increasing demands for nickel the International Nickel Company is expanding its mining operations and developing its electrolytic refining processes at its plants near Sudbury, Copper Cliff and Port Colborne in Ontario, Canada. Underground mining is to be stepped up to more than offset the loss of openpit ore as the Frood-Stobie pits are depleted. Six mines, producing 1,000,000 tons per month, are currently in operation and ore reserves are estimated at 251,800,000 tons.

A new process, developed by Inco's research department, will be placed in operation in several months. This process is the oxygen-flash-smelting of copper concentrate. The new system may later be used for nickel concentrate.

Two new electrolytic cell units are being added to the Port Colborne refinery to give added capacity in the event that Inco is called upon to refine nickel for other producers, as it did in World War II.

LATIN AMERICA

BOLIVIA—*Cie. Aramayo de Mines en Bolivie* plans to install two new No. 3 Wemco Mobilmills at its property near La Paz. Each mill will have a seven-foot HMS cone; one mill will be used to treat lead-silver ore and the other to treat tin ore.

MEXICO—The discovery of important copper deposits near Barra de Navidad, Jalisco, was announced by Ernesto Rios, president of *Cia. Minera de Santa Fe, S. A.*, after a personal survey along the Pacific coasts of Jalisco, Colima, Nayarit and Sinaloa. The company controls copper-cobalt-nickel properties at Pichucalco, Chiapas.

BRAZIL—Production of iron ore has increased substantially in the past several years. In 1949 Brazil produced 508,000 tons and in 1950, from January to June, it produced 339,000 tons. Production of steel in 1949 was 605,000 tons and in 1950 (January to June), 377,000 tons. Domestic consumption is only about 20 kilograms per year per capita, however, an amount 10 to 15 times lower than in highly industrialized countries. Foreign countries, especially Germany, have been ordering iron ore in larger quantities, and as a result production continues to rise. The *Companhia Vale do Rio Doce* in Minas Gerais will export 1,500,000 tons of iron ore in 1951, compared with about 750,000 tons in 1950. In 1953 the company expects to export 3,000,000 tons.

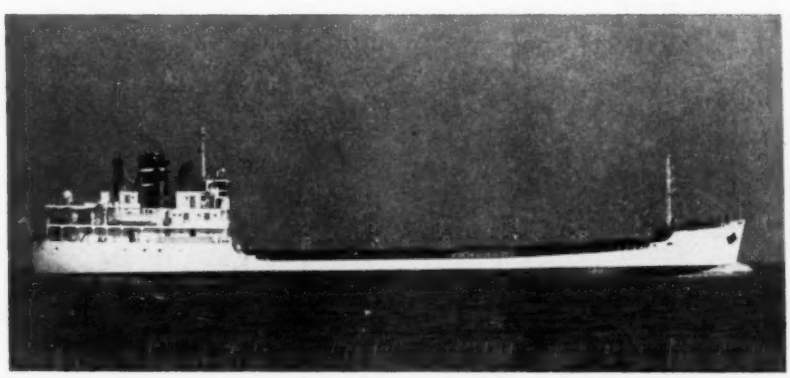
ARGENTINA — The exploitation now being carried on in the provinces of Jujuy, La Rioja, Mendoza, Cordoba, and Neuquen is expected to make Argentina an important producer and exporter of barite. This year the government fixed at 5,000 tons the exportable quota. To increase this amount, a major project to open up potentially productive zones will be carried out. As most of the deposits lie in remote and desolate regions, and as the peak year of 1944 when 14,405 tons of barite was produced must be surpassed, the new project has a high standard to follow.

ARGENTINA—In San Juan province a magnetite deposit has been discovered in the hills east of the Ansilta mountain chain and is under investigation. In Buenos Aires province technicians from the National University of La Plata have verified the existence of iron deposits in the La Tinta mountains. The deposits appear to measure about two meters thick and carry 75 percent iron oxide with only small amounts of silica.

BRAZIL—Three new deposits of manganese ore have been discovered recently. One is near Sao Felipe, Guacui, State of Espirito Santo, and

NEW IRON ORE CARRIER TO TRANSPORT VENEZUELAN ORE TO TIDEWATER

The S. S. PUNTA ARAMAYA is the first of two shallow-draft ore carriers to be built by the Bethlehem-Sparrows Point Shipyard, Inc. for iron ore transportation on the Orinoco River in Venezuela. The vessel is 360 feet long, has a beam of 64 feet and a draft (loaded) of 24½ feet, and a gross tonnage of 4,650. It will be operated by the Ore Steamship Corporation of New York from the Orinoco River port of Palua to the tidewater port of Puerto Hierro on the Gulf of Paria, south of the Island of Trinidad. The iron ore is loaded at Palua from a conveyor belt which has been built high enough to allow the ore carriers to moor beneath it at any time of the year despite a river level fluctuation of 40 feet. At Puerto Hierro the iron ore will be discharged into ocean-going carriers for shipment to the United States.



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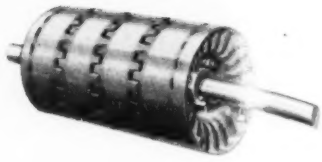
Powerful, air cooled electro magnetic pulleys are ideal where well loaded conveyor belts are used. Installed as head drive pulley, tramp iron is discharged automatically. Low operating cost, long life and extreme power characterize this workhouse of the Dings line. Catalog C-1001A tells you why this magnet is exceptionally efficient.



Dings *non-electric, self-energized* Perma Pulley magnets are recommended where burden depths do not exceed 3". Within this range, these are the magnets to use because of their unsurpassed concentration of magnetic strength near the surface. Catalog C-1007A.

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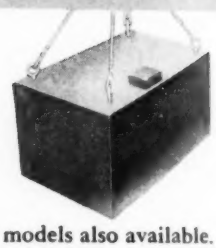
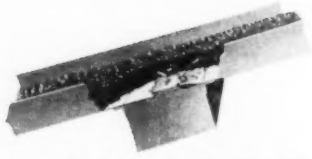
Power close and power that searches down as deep as 18" to yank tramp iron out. If the Dings rectangular won't do it, it can't be done. Triple pole, double gap design. Install horizontally, vertically or at an angle above belt conveyors or in chutes. Self-cleaning fully automatic models also available. Catalog 301-A gives details.



SPOUT MAGNETS?

Essentially the same design as the rectangular suspended but special features make spout magnets perfect for installation in chutes or spouts. As material flows over the magnet, iron is attracted and held securely below a step in the face against the downflow of material. Easy to install. Easy to clean. The spout magnet is available with or without the Dings automatic safety gate, a device acting in effect like a trap door in the chute, which opens automatically when the current is interrupted, disposes of collected tramp iron. Ask for Catalog 301-A.



Magnets shown here are available in size ranges for most applications. Special magnets can be made for any application. Write today for recommendations.

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MAGNETIC STRENGTH

the second at Chapadao, Guacui, in the same state. The third is at Betim, State of Minas Gerais. Mining operations are already in progress.

MEXICO—Striking railroad workers who had been holding up ore shipments over the Coahuila-Zacatecas Railroad, which is run by the *Mazapil Copper Company*, resumed the line's operations and agreed to submit their differences with the company to arbitration, after a walkout lasting a month and a quarter. A Federal Labor Board will rule on the workers' demands. Throughout Mexico an increasing number of labor strikes in mines and railways have been plaguing and crippling the mining industry.

BOLIVIA—The Reconstruction Finance Corporation, Washington, D. C., is trying to obtain increased shipments of tin from Bolivia. Half of Bolivia's tin is produced by the *Patino* interests and half by independent operators. Patino tin goes to England and the RFC buys much of the remainder. Negotiations with the independent operators are now under way.

MEXICO—A sharp rise in the United States' orders for lead, zinc and copper has brought about a spurt in the activities of Mexican mining companies producing these metals, according to executives of the *American Smelting and Refining Company* and the *Compania Minera de Penoles*. These companies, which reduced lead production 12 percent several months ago, are not only back to normal production but also hiring additional workers. Smaller Mexican companies mining lead, zinc, and copper have confirmed the large companies reports.

MEXICO—A heavy increase in the filing of mining claims to work both abandoned properties and new prospects is reported by the Mexican Economy Ministry. Most of the claims, the Ministry said, are concentrated in the States of Sonora, Chihuahua, Durango, Guerrero, Zacatecas, Hidalgo, and southern Lower California.

EUROPE

HUNGARY—In Western Hungary, north of the Matra, near the Czeckoslovakian frontier, uranium resources have been discovered which the Hungarian Mining Department is classifying as an extension of the Czeckoslovakian uranium deposits. The Russian Military Mission in Budapest has ordered that the site where the mineral has been discovered should be occupied by Russian State Police officials.

ROMANIA—A copper ore structure is officially reported to have been discovered in the Gheorghieni zone. According to estimates the deposit could yield a yearly output of 200,000 tons of copper ore, and its exploitation is to be carried out by a cooperative society of Romanian mining men.

ENGLAND—*Geevor Tin Mines, Ltd.*, in Cornwall, is proceeding

satisfactorily with its mechanization project. Three more Holman drill rigs are being installed and two more Eimco-Finlay loaders and an electric locomotive have been ordered. In the year ended March, 1950, the company milled 49,634 tons, slightly less than the previous year, but average recovery rose by 2.71 pounds of black tin per ton and tons produced rose 10.7 tons to 638.6 tons. Because of the increased efficiency of the mine and the rocketing price of tin, results should be better this year.

FINLAND — Detailed investigations of a nickel discovery at Harjunpaa, Ulfsby, near the city of Pori, reveal that more than ten workable ore deposits exist. The deposits are thought to be larger than those transferred to Russia as a result of the Finnish-Russian peace treaty in 1945.

ENGLAND—British factories are having to work part time and lay men off due to the acute shortage of aluminum, nickel, sulphur, zinc, base metals, textiles, semi-finished steels, brass and coke. Heavy American buying, both for private and governmental purposes, has created metal famine conditions both in Britain and Western Europe. Schemes, mainly devised by the French, for some form of international allocation are being discussed by Marshall Plan countries. But in London official and business experts believe that a little moderation by the American stockpilers and the end of the "panic" buying will right the position except in a few instances such as sulphur and nickel.

HOLLAND — The *Billiton Company* has started operating a plant to produce slagwool from tinslags. The plant was erected next to the company's tin smelter at Arnhem and reports say that the product has been very satisfactory.

SPAIN—Lead exports for 1950 are expected to be 20,000 tons, when tabulation is completed, compared with 3,000 tons in 1949. Lead production in 1949 was 44,000. Reopening of old mines and rewashing of slag are partly responsible for 1950 export increases.

ITALY—The *Societa Mineraria Ligure*, after 10 months' operation of the Santa Vittoria de Libiola copper mine, five kilometers from Sestri Levante (east of Genoa), produced 18,340 tons of ore containing 298,942 kilos of copper, 2,529,086 kilos of sulphur, and 2,228,310 kilos of iron-bearing calcine. During the period, ore reserves amounting to 277,470 tons were discovered.

FRANCE—Production of cobalt at the *Pombliere* (Savoie) plant is averaging about 15 tons a month now. The plant was closed last year, from March to June.

NORWAY—The Norwegian Government, which established a large aluminum plant at Ardal, West Norway, after the war, has asked the Ardal management to examine the possibilities of building a new aluminum plant further north at Sunndalsora, near the large Aura power station now under construction. The estimates for the new factory, which would have a capacity of 40,000 tons a year, will be ready in a few months. Meanwhile a Greek Government commission in Oslo has offered to supply 40,000 tons of bauxite a year if plant expansion is carried out. As Norway has cheap and all-year-around hydro-electric power, the managing director of the Ardal factory, Mr. Owe, says expansion is

BIG NEWS

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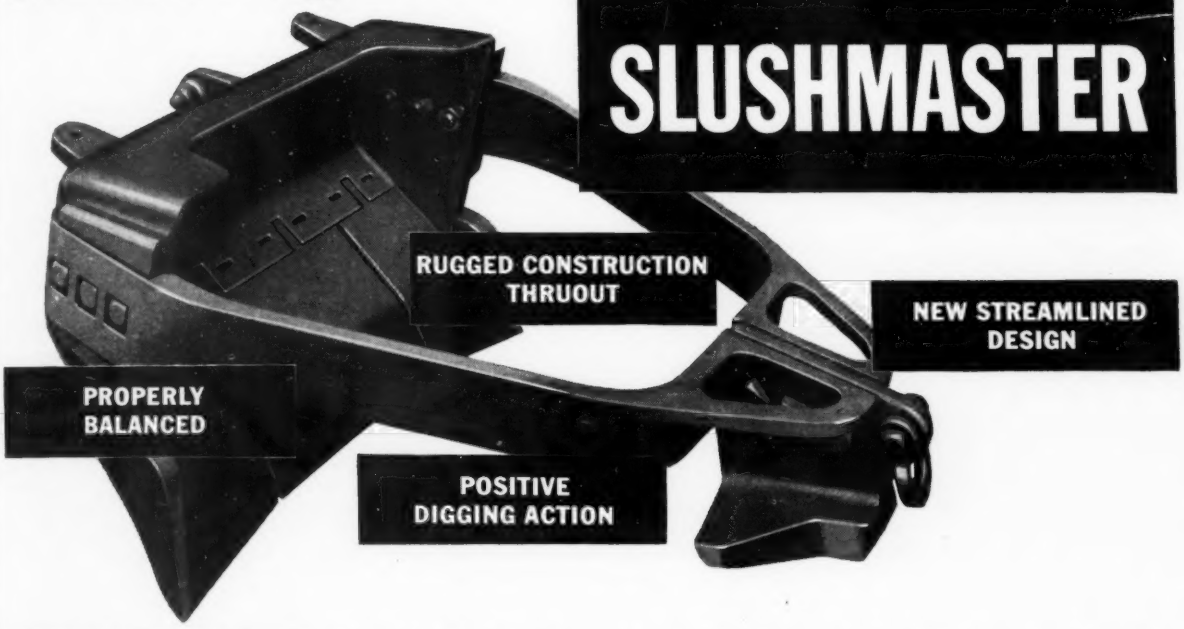

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Extra heavy-duty construction thruout. Complete line of widths and capacities to suit your hoist horsepower. Nine different models from 26″ to 60″ widths —398 lbs. to 2100 lbs. Send for bulletin.

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certainly feasible from that standpoint.

GERMANY—To assist the aluminum industry, the Economic Cooperation Administration is loaning about $8,000,000 to German aluminum manufacturers from Marshall Plan counterpart funds and is helping Germany to purchase 450,000 tons of bauxite from Greece over the next few years. Already the *Lippe* aluminum works at Luenen, Westphalia, have been reopened and are operating at one-third capacity (1,000 tons monthly), according to Dr. Lorenz, director. A shortage of electric power is the main cause of curtailed production at present.

ITALY—The *Montecatini General Mining Company* of Milan has acquired new pyrite-bearing properties, known as the *Riva* mines, in the Grosseto district north of Rome. An output of 300,000 tons yearly for the next 20 years is contemplated by the company. Mining equipment will be imported from the U. S. A. through the European Recovery Program for mechanization of the mines.

CORSICA—The *Societe Miniere de l'Amiante* extracted 700 tons of asbestos during August, at its mine at Canari. In the first three quarters of 1950, 4,252 tons was produced, and through improvements in equipment the company expects to produce 10,000 tons during the 1951 years.

ITALY—The *Monteponi Mining Company*, which operates zinc mines in Sardinia, has rehabilitated its smelting plants at Vado Ligure (Savona) with equipment and machinery recently imported from the U. S. A. through the ERP. The company also is considering a project to extract an estimated 2,000 tons of copper yearly from copper deposits recently discovered in the Nuoro district of Sardinia.

ITALY—Leaders of the Italian Ministry for Industry, Mining Department, are hoping to receive a loan from the U. S. International Reconstruction and Development Bank to help carry out research and exploitation of Italian resources. Important iron ore reserves are said to exist in the Monte Amiata zone in the Bolsena Lake district northwest of Rome. To develop these deposits expert research workers and modern machinery and equipment are needed.

WESTERN AUSTRALIA—A proposal has been made to reopen the *Galena Lead Mines* in order to extract about 6,000 tons of ore between the 100 and 200-foot levels. Unless this work is undertaken little payment to creditors will be possible. If the necessary capital is subscribed and the work carried out, a profit of £14,000 is expected to be made, which would lower debts substantially.

TASMANIA—Output of blister copper by *Mt. Lyell Mining and Railway Company, Ltd.*, was 8,072 tons for the year ended September, 1950, compared with 3,871 in the previous year. Larger supplies of coke were available for smelting operations during the 1950 year.

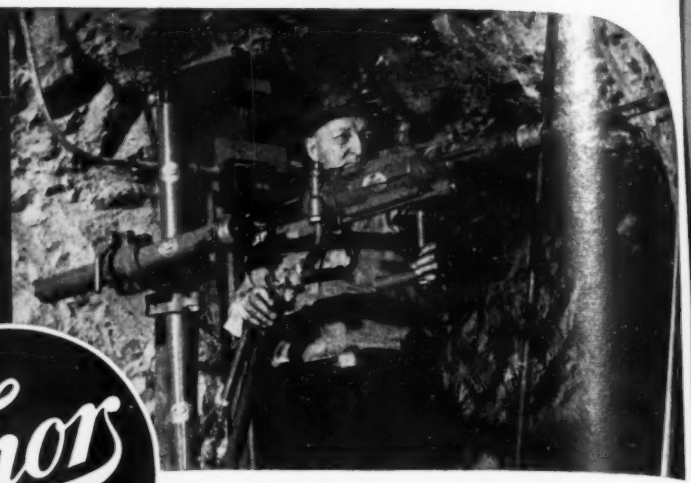
WESTERN AUSTRALIA—The manager at *Edwards' Find* states that, having broken through to the main orebody from the new shaft at the 300-foot horizon, reef was four feet, six inches wide and sampled two ounces per ton over the full width. Payable gold has been mined over three miles along the strike of parellel lenticular quartz reefs in this locality.

PHILIPPINES—October production for *Benguet Consolidated Mining Company* was the highest in the post-war period, according to President John W. Haussermann. The last 15 days of October showed 2,290 tons milled per day against an average of 1,545 tons per day in 1949.

AUSTRALIA—Gold production for the first nine months of 1950 was 627,221 fine ounces, 4.6 percent lower than the previous year and 48.5 percent lower than 1939. During the month of September, Western Australia, the chief producer, contributed 49,941 ounces of the total Australian output of 72,406 ounces.

PHILIPPINES—When *General Base Metals, Inc.*, took over the development of 10 manganese claims in Bohol province in 1949, output was 50 tons daily and 6,400 tons con-

REVERSE FEED OR STANDARD FEED



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Regular correspondents in the following cities and mining centers:

Stockholm, Cyprus, San Jose (Costa Rica), London, Tokyo, Frankfurt, Vancouver, Paris, Mexico City, Helsinki, Redruth (Cornwall), Oslo, Benares (India), Dersley (Transvaal, South Africa), Singapore, Madrid, Ankara, Lima, Rome, Sao Paulo, The Hague, Johannesburg (South Africa), Trondheim (Norway), Port Kembla (N. S. W., Australia), Costermansville (Belgian Congo), Accra (Gold Coast).

WORLD MINING is published the 26th of each month as a regular department of MINING WORLD and is also circulated as a separate section on a carefully controlled free basis to a selected list of management and supervisory personnel associated with active mining enterprises throughout the world.

taining about 45 percent manganese had been produced. Since then and for the first nine months of 1950, operating rate has been 100 tons daily and 13,182 tons has been produced. With demand high, General Base Metals intends to double production in 1951. The mine's reserves are only generally known at present; ore is of two types—high grade and fine, and low grade and washable. Mining is done by openpit methods and high grade and low grade ore are separately mined. Most of the exports go to Japan and the remainder to the U. S. A.

WESTERN AUSTRALIA — *Great Western Consolidated N. L.'s* Southern Series drive will soon enter the area in which an orebody was located by diamond drilling. During access-road excavations a gold-bearing lode formation was uncovered and is being developed to determine its value and extent. The main shaft's permanent headframe is under construction.

AFRICA

SOUTH AFRICA—H. J. de Plessis, mining commissioner at Pietersburg, has given several reports on mining activities in northern Transvaal: The *Knights Pietersburg Gold Mine*

MANGANESE OUTPUT — 400 TONS HOURLY

The washing plant of the African Manganese Company, Ltd., at Nsuta, Western Province, Gold Coast, treats about 400 tons of ore per hour from the company's Nsuta mine, probably the largest manganese mine in the world. The tracks in the foreground lead directly to the open pit mine. During the first nine months of 1950 the United States imported 46,481 tons of battery grade and 180,910 tons of metallurgical grade manganese ore from the Gold Coast, a great part of which came from the Nsuta mine.

has been taken over by a new company, which has acquired a new mining plant for the property. As extensive prospecting has been under way, production may not be long delayed. The *New Welkom* mine also has been taken over by a company with a nominal £175,000 capital, and new equipment is expected to be installed soon. Drilling activity at the old *Ellerton* mine was extensive. Production of crystal corundum is increasing and will continue if prices stay high; a plant for processing corundum is being constructed near Johannesburg. Demand for asbestos is improving.

SOUTH AFRICA—An electrostatic separator for use on gravity concentrates from alluvial diamond deposits has been developed by A. A. Linari-Linholm of the Diamond Research Laboratory, Johannesburg. He has said that while the normal grease-table method of concentration, depending on the non-wettability of a clean diamond surface, is satisfactory for recovering diamonds from primary ores, such as blueground and kimberlite, diamonds in the secondary alluvial deposits frequently possess a water-avid surface which renders the grease-table method unusable; in such cases, gravity concentration, followed by electrostatic separation of the diamonds from the heavy metallic minerals in the concentrates, has been found the best method. A plant-size electrostatic separator, capable of treating one ton of six-millimeter gravity concentrates per hour, is under construction now at the Diamond Research Laboratory and is expected to be in use early this year.

SOUTH-WEST AFRICA—M. Knowles, a Johannesburg consulting engineer, has submitted a report to the *South African Minerals Corporation* on that company's recent manganese discoveries, 100 miles north-east of Okahandja in the Otjiwarongo field. He says the discovery is of the greatest value and steps should be taken immediately to produce manganese ore at an annual rate of 70,000 tons. South African Minerals has registered 64 mineral claims on seven farms in the area. The portion so far prospected is 20 miles long with a bed width of 10 to 150 feet. The nearest port is Walvis Bay, 210 miles away.

BELGIAN CONGO—The *Kipushi* mine of the *Union Miniere du Haut Katanga* suspended work for several weeks recently because of a fire which broke out and necessitated flooding the mine up to the 310 level. Depth of the mine is 1,640 feet. Smelter production was unaffected as the company had sufficient stockpiles from which to draw. The Kipushi mine's copper-zinc orebody is 65 to 200 feet wide, 1,300 to 2,000 feet long and dips 70°. About 1,360,000 metric tons of copper has been produced from the mine since 1925.

SOUTH AFRICA—An insight into growing base metal output is provided by reports from three associated companies, *Consolidated Chrome Corporation, Norma Asbestos Mine, Ltd.*, and *Leeuwbosch Lead Mines, Ltd.* At Consolidated Chrome, initial difficulties with the concentration plant have been overcome, and for the past twelve months the plant has produced from 2,600 to 5,400 tons of several grades per month. The company's production

Churndrill knocks out blast holes faster since Tiger Brand "Mor-Spring" wire rope was installed at a Utah mining company. Specially designed for elasticity, new drilling line helps produce maximum chipping from each stroke.

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U·S·S TIGER BRAND Wire Rope

UNITED STATES STEEL

is fully booked until June, 1951, by contracts totalling 30,000 tons. The Normandie asbestos mine has been producing run-of-mine chrysotile asbestos fiber in moderate quantities, this grade constituting about two-thirds of the output and selling at £120 to £125 per ton. Short fiber chrysotile has made up the remainder, selling at £60 per ton. The cleaning plant recently was enlarged to a capacity of about 70 tons of fiber per month, and both the quality and prices of this plant's output are expected to rise. The Leeuwbosch lead mine, in the Rustenburg district, Transvaal, is still in the developing stage. So far, five lead-bearing lodes have been prospected with good results; actual mining has been confined to the "B" lode, on which 2,700 feet of development has been carried out on 45-foot, 100-foot and 150-foot levels. The pilot plant produced 31 tons of lead concentrates during September, and additional equipment is being installed to raise daily output to four tons. A smelting plant has been installed.

ASIA

INDIA—Officials of Sandur State, where large deposits of high grade, low phosphorus manganese ores exist, are considering the production of ferro-manganese by the electric process as soon as the Tungabhadra Hydro-Electric Project, now under way, starts operating.

TURKEY—One of three 500-ton-per-day units of *Murgul Copper's* new flotation mill, and also the new smelter, are now operating. Supervising the work is John W. Sheedy, formerly mill superintendent at Cia. Huanchaca de Bolivia and now mill superintendent at Murgul. His assistant is Suphi Yavasca.

INDIA—The Council of Scientific and Industrial Research (S.I.R.) approved several projects recently, including the establishment of a pilot plant for the recovery of sulphur from gypsum; studies on the production of aluminum metal by electrolysis of molten anhydrous aluminum chloride; and research on low carbon alloyed steels containing manganese. The council said that the pilot plant will be used to try using copper pyrite and other sources of sulphur for the manufacture of sulphuric acid.

TURKEY—The Economic Cooperation Administration has sent Ronald Campbell Rutherford, consulting engineer, to Turkey to help determine the advisability of reopening two lead mines and constructing a smelter to process the ores. Rutherford will experiment with direct smelting of the high-arsenic, low lead, gold and silver ore of the *Bolkardag* mine, last operated about 600 A.D., and of the lead concentrates of the *Keban* mine. He is a graduate of the Royal Technical College of Glasgow, Scotland, and a member of the American Institute of Mining & Metallurgical Engineers, and has a patented process for removal of arsenic lead from lead bullion.

CHINA—In the third quarter of 1950, iron and steel production from the Whapei region (including Peking, Tientsin and five provinces) increased a reported 200 percent compared with the same period of 1949.

INDIA—A lead-zinc separation plant is being installed by the indigenous producers of India. However, zinc concentrates are to be offered for export because of lack of smelter capacity in the country. The Government has announced that it will allow export of the concentrates to all permissible destinations provided the importer guarantees to supply India in turn with the equivalent tonnage in sulphur and zinc.

TURKEY—The Turkish Government has decided to create four regional mining offices in Turkey in order to supervise and support the development of the mining industry better. The Istanbul Mining Department is to supervise the Zunguldak coal mining district and the Izmir copper mining districts, while the Ankara Mining Department is to supervise the central Turkey mining industry. In eastern Turkey there are

to be two mining departments, one in Erzerum and one in Diarbekir. The Government has also announced that mining equipment and machinery imported from foreign countries will be exempted from the import duty for a period of ten years, and Turkish mining engineers are to be sent, at State expense, to German universities for specialized studies.

INDIA—Several factors are likely to make India's production of mica rise a good deal in the immediate future. One is the current emphasis on industrialization which will mean a larger local consumption. Another factor is the need for the United States—already India's best mica customer—to import block mica to meet defense requirements. (In June 1950, the U. S. imported 1,500 short tons of various forms of mica from India.) Of India's total output 80 percent comes from Bihar State where 50,000 to 60,000 persons are employed in mines and factories and where 100,000 are self-employed in splitting the mineral. Also, at Calcutta a small factory currently is producing micanite (a manufactured form of mica), and a second factory of this type is being built near Madras. Other new projects are being planned.

CANADA—Mineral production in Canada is heading toward a new record and in the first eight months of 1950 compared with the same period in 1949 the following figures are available (in tons, except where otherwise indicated):

	1950	1949
Asbestos	520,680	291,471
Copper	173,931	173,231
Iron Ore	2,005,152	2,257,457
Lead	103,615	98,013
Nickel	79,059	87,825
Zinc	203,916	188,062
Gold, ozs.	2,944,786	2,655,977
Silver, ozs.	14,090,746	11,285,721

Of interest to note in connection with the figures on lead and zinc is that the Reeves Macdonald Mine in British Columbia increased production from 9,933 tons of ore in January to 24,266 tons in September, 1950.

ONTARIO—*Pen-Cobalt Silver Mines, Ltd.*, is preparing for development of the *Penn Canadian* group of four claims in the Cobalt area of northern Ontario. Several cobalt-bearing veins have been located in old workings consisting of one 305-foot shaft with five levels and three 40-foot winzes from the bottom level, and another 210-foot shaft with three levels. The company has erected a new change house, office building, hoist house and headframe; the hoist is installed. A. D. Hellens is consulting engineer.

PENNSYLVANIA—The *Bethlehem Steel Company* has acquired about 1,750 acres of land near Morgantown where a deposit of magnetic iron ore has been found. Development plans of the company have not been revealed but a general prospecting program is continuing. Drilling to date has not yet been conclusive as to quantity or quality of ore.

Another prominent group selects NORDBERG *throughout*

6000-Ton-Per-Day Rock Crushing Plant for Preparation of Mine "Backfill" Aggregate at Kandilli District Operations of Ereğli Kömürleri İşletmesi, Zonguldak, Turkey

NORDBERG "KNOW-HOW and MACHINERY" have been selected again for an essential and important crushing operation,—this time by E. K. I., of TURKEY, the predominant Coal Mining group whose extensive workings in the Zonguldak Coal Basin on the North Coast of Turkey, overlooking the Black Sea, are being modernized and improved through a vast mechanization and electrification program to double the annual coal output of the country.

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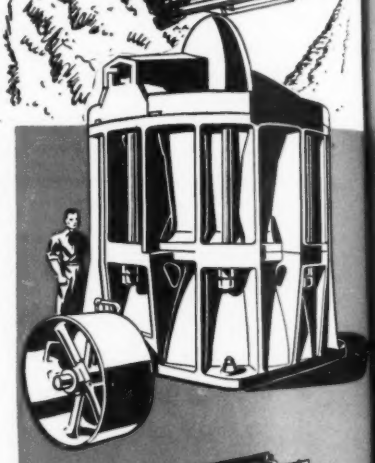

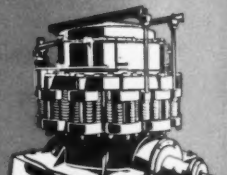

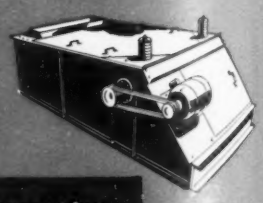

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BRITISH COLUMBIA - QUEBEC—*Golden Manitou Mines, Ltd.*, is financing two interesting properties which show major possibilities. The one in British Columbia is the *Mastodon* mine, 15 miles north of Revelstoke, and owned by Dr. D. F. Kidd and associates. Underground development work in the past two years, including a long low-level crosscut, has revealed excellent zinc and acceptable lead values with the result that plans are now said to be forming for the construction of a mill this year. At Golden Manitou's Quebec property, in Barraute Twp., initial drilling has resulted in the discovery of a wide structure with zinc, silver and some gold, lead and copper values. A new company, called *Barvue Mines Ltd.*, has been formed to develop and mine these claims. S. A. Perry has been named president.

YUKON TERRITORY—*Mackeno Mines* is hastening its development program and has set up compressors and machinery to start driving adits both at the McLeod and Sime sections of the property at Keno Hill. The McLeod adit will be driven 100 feet below the bottom of the shaft to intersect a silver-lead zone expected as a downward extension of a vein zone exposed in the McLeod shaft and 1st level drift. The zone may be an extension of United Keno Hill's fracture zone. The Sime adit should cut a showing 340 feet below the shaft and will serve for a northwesterly crosscut toward McLeod workings and for exploration of a virgin area between the two sections.

ALASKA—Al Stout has sold his outfit, including two bulldozers, to *Yukon Placers* and will work for that company on Ballarat Creek on the upper Yukon River next season. The placer mining method used by the company involves the use of a "slick plate."

BRITISH COLUMBIA—*The Consolidated Mining and Smelting Company of Canada, Ltd.*, at Trail, will soon start extending its power transmission lines to carry 75,000 kva at 170,000 volts, from its Kootenay River generating plants near Nelson to Kimberley, at an estimated cost of $3,000,000. The project will take two years. A second project the company is starting is the construction of a $9,000,000 plant at Kimberley for the annual production of 70,000 tons of high grade ammonium phosphate fertilizer. A third project is an addition to the electrolytic zinc refinery at Trail, to cost $3,200,000 and to increase zinc output by 70 tons daily. The company has already started developing its openpit mine at Kimberley, expected to yield a total of about 2,000,000 tons of zinc-lead ore.

MINNESOTA—The *M. A. Hanna Company* is developing a new openpit mine on the Cuyana range, called the *Section 6*. Stripping was begun in November and plans call for the removal of about 1,500,000 cubic yards during the winter months in order to have the property ready for iron ore production later this year. Stripping will be done by a 7-W dragline on 54-B Diesel shovels with 24-yard bottom-dump semi-trailers and 20-ton end-dump trucks. The ore will be hauled by trucks to the Maroco plant for beneficiation.

QUEBEC—Mill expansion, the sinking of both a new shaft and of a four-compartment winze, are under way at *Lamaque Gold Mines, Ltd.'s*, mine in the Bourlamaque district. Current mill capacity is 1,500 tons daily, and the addition will bring rated capacity to 2,000 tons daily. The new shaft is being sunk in the No. 2 mine area to open the new north ore zone which will be mined in a separate operation from the main zone. The shaft will be 1,200 feet deep with eight stations. The winze will be sunk north of the main No. 7 surface shaft from the 2,400-foot level to the bottom, or 3,600-foot level of the main shaft. Value of the company's production during 1950 has been estimated at about $4,000,000.

YUKON TERRITORY—H. S. Bostock, Canadian government mining engineer, reports an important iron ore deposit in the Yukon district, extending from the Ogilvie Mountains southeast to the South Nahanni River. Bostock, in his report to the government, states that this is one of few great iron ore reserves within 500 miles of the Pacific Ocean in either North or South America. Quality and grade of the ore are said to resemble those of Lake Superior district ore.

WASHINGTON—*Pend Oreille Mines and Metals Company* shipped the first concentrates from the recently-opened 800-ton unit of its new mill late in December, according to W. L. Ziegler, manager. In the beginning of January a third shift was added at the mill and, with three shifts also operating the old Josephine mill, between 1,400 and 1,500 tons of zinc-lead concentrates are being produced daily. The company is constructing two more units to the new mill, one of which will be completed in the summer.

BRITISH COLUMBIA—*Emerald Glacier Mines*, a silver-lead-zinc property in the Tweedsmuir Park district of the Omineca region, will soon install the 200-ton mill formerly operated by *Kenville Gold Mines* in the Nelson district. G. H. Rainville, Montreal, is president of the Emerald Glacier Company, and Dr. F. C. Buckland, general manager.

MONTANA—Work at *Victor Chemical Company's* $5,000,000 phosphorus plant at Silver Bow is in progress—an electric furnace is being constructed on the company's 543-acre site at the junction of the Union Pacific, Northern Pacific and Milwaukee Railroads. Exploration and development of the mine also is under way and eventual production of about 600 tons of phosphate daily is planned.

ALASKA—The *J. E. Riley Investment Company* may start dredging next season on Otter Creek near Flat, according to Thomas Jensen, partner. The dredge the company owns is a 3½ cubic foot machine. Preparatory work was done by the company during last summer's mining season.

QUEBEC—*Barnat Mines, Ltd.*, has completed sinking its No. 3 shaft to 1,457 feet and has established six new levels. Construction of a surface plant at this shaft is under way. Six new stopes are being prepared for production, and a backfill raise system has been established from the 725-foot level to the 175-foot point. Barnat is a gold producer and holds 2,392 acres in the Malartic area, northwestern Quebec.

OKLAHOMA—Rocks believed to contain traces of uranium have been found near Glencoe, 65 miles west of Tulsa and are being studied by government assayers. About 1,300 acres of land have been leased by a syndicate, headed by Lee Uto of Parsons, Kansas, and are being prospected.

WASHINGTON—*Admiral Consolidated Mining Company* reports $33,353 net smelter returns to December 1, 1950, since production was resumed just last fall under the direction of John Colby, veteran Stevens County mining man. The mine and mill are one mile north of Leadpoint, and ore concentrates are shipped to *The Consolidated Mining and Smelting Company of Canada's* smelter at Trail, British Columbia. Average grade of concentrate has been reported about 60 percent zinc, 2 percent lead and one-half ounce of silver per ton.

NORTHWEST TERRITORIES—This spring *Salmita Consolidated Mines, Ltd.*, will start shaft sinking at its gold prospect in the Courageous Lake area, 150 miles from Yellowknife. Equipment is being flown in from the latter now. The shaft will have two compartments and will be sunk 200 feet; 1,000 feet of lateral work will be done on both the 100 and 200-foot levels.

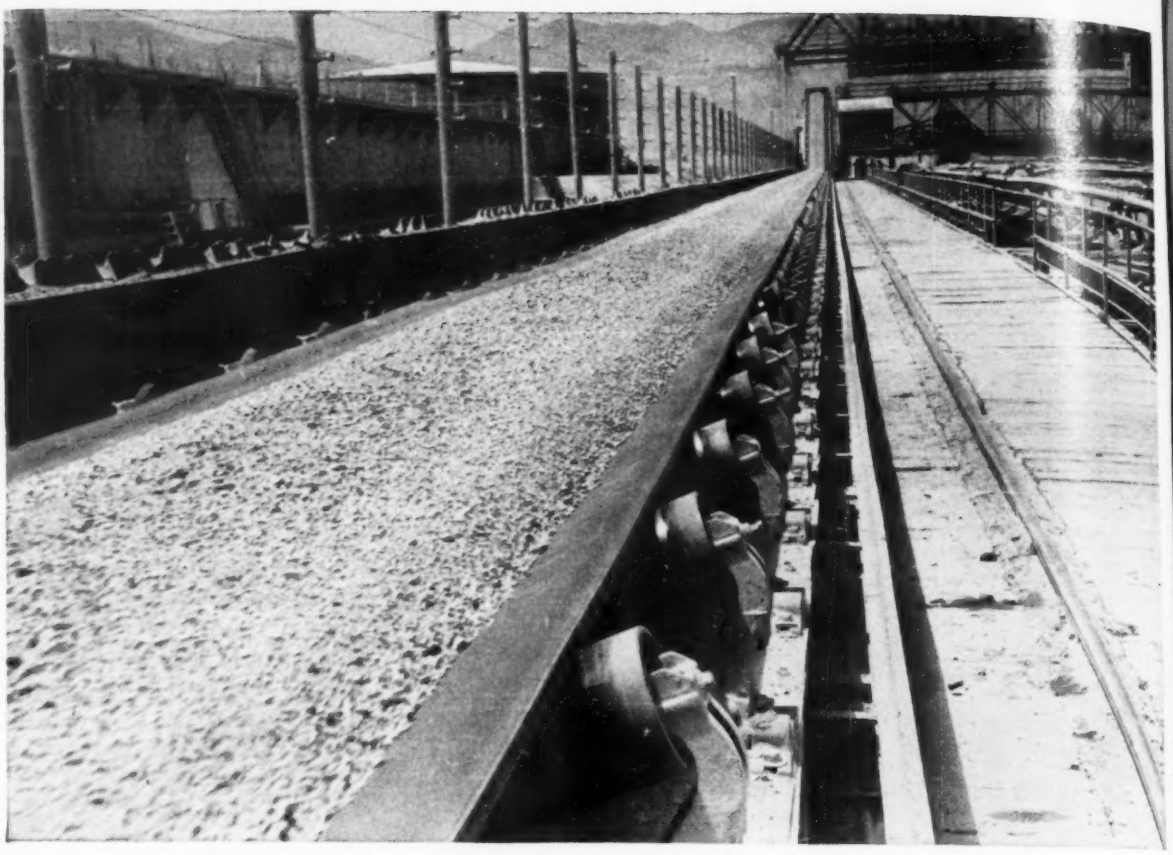
ARIZONA—The low grade, open-pit copper mine to be developed by *Phelps Dodge Corporation* at Bisbee, will cover an area about 2,000 by 3,800 feet, and stripping of waste from the orebody will be done to a depth of 350 feet. The company, now engaged in initial drilling, estimates that cost of development and bringing into production of the new pit will be $25,000,000.

QUEBEC—*Sigma Mines, Ltd.*, is deepening its shaft 1,000 feet to a depth of 3,000 feet and at present is cutting the 18th level at 2,250 feet. The mine is near Val d'Or. Mill rate for the past year has averaged 1,163 tons of gold ore daily and recovery rate has been about $6.64 per ton.

MONTANA—A 500-foot tunnel is being driven on uranium showings near Alhambra by George Hoffman and Harry Mann of Clancy, who are under contract to the *Newmont Mining Corporation*. The property being developed is the old Haines homestead.

BRITISH COLUMBIA—*Sunshine Lardeau Mines, Ltd.*, plans to install at mill of 50-tons capacity at its *Spider* mine near Camborne, according to Harry E. Holcombe, president. Diamond drilling during 1950 has outlined four main veins with values in silver-lead-zinc. The company owns four groups totalling 30 claims in the Trout Lake and Lardeau mining division. The *Spider* and *Elsmere* groups are base metal properties and the *Winslow* and *Sunshine* groups are gold-bearing.

IDAHO—Operating at half-capacity—100 tons daily—*Sun Valley Lead-Silver Mines, Inc.*, started in January to operate its new mill in the Warm Springs district near Ketchum, Idaho. A second ball mill with a capacity of 100 tons will be installed in the spring to bring the mill to capacity operation. Flotation equipment in the new mill includes four 44-inch WEMCO Fagergren cells, a four-cell Morse Bros. Weinig flotation machine, and an eight-cell Union Iron Works flotation machine. Designed to process ores from the *Sunday* mine, the mill is now being fed stockpiled ores. John R. Thornton of Bellevue is superintendent.



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In eleven years this S-A heavy-duty belt conveyor has moved more than 91 million tons of copper ore over a distance of 1412 feet . . . and the conveyor is good for many more years of equally heavy duty service. Travelling at a speed of 600 feet per minute, 4818 tons of copper ore are handled per hour—a continuous, high-capacity operation that shows an exceptionally *low cost per ton handled.*

Soundly engineered, S-A Bulk Materials Handling Equipment is employed by leading producers of metallic ores the world over for all phases of handling. When you consider a new conveyor system, or an addition to your present equipment, look to the S-A staff's 50 years' experience and the complete S-A line to provide the right answer. *Write today —no obligation.*

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PORTABLE ELECTRIC SAW: For complete information on Independent Pneumatic Tool Company's new low-priced 6-inch Thor portable electric saw write for circular No. JE-1259.

PUMP AND MOTOR: Design and construction features of a close-coupled pump and motor, the electrifugal, are described in a bulletin just released by Allis-Chalmers Mfg. Company. It has a single shaft mounted in an exclusive unit-cast frame to assure perfect and permanent alignment. Write MINING WORLD for Bulletin 52B6140B.

GEAR DRIVES: Link-Belt Worm Gear Drives of three basic types, each available in 10 different sizes, for fractional or large horsepower, and in speed ratios of 3⅝ to 1 up to 8,000 to 1, are illustrated in a new 80-page Book No. 2324.

LOADER: The Joy Manufacturing Company 18-HR-2 loader, designed for high-capacity tonnage in metal and non-metallic mines, is described and illustrated in a new bulletin. Request Bulletin No. J-108.

ROD MILLS: The Hardinge Company has just published revised literature on rod mills for grinding and pulverizing. Bulletin 25-B discusses the new type Convex-Head Hardinge rod mill as well as the standard Hardinge Conical-Ended rod mill.

Copies of all bulletins may be obtained by writing MINING WORLD, *121 Second St., San Francisco 5, Calif. Please refer to bulletin number and issue in which it appeared.*

TRUCK BODIES AND HOISTS: Complete information on heavy duty Heil bodies for your off-the-road dumptrucks or earth movers, and Heil hydraulic dump-truck hoists, is available on request from MINING WORLD.

EXCAVATOR: Marion Power Shovel Company has released a bulletin describing the Marion type 43-M machine, an all-purpose 1 cubic yard excavator. Write for Bulletin No. 400.

DIESEL POWER: The application of diesel power in shovels, draglines, crushing machinery, compressors, and for production of electric power in mining operations is pictorially illustrated in a booklet titled "Why Caterpillar Engines Are Best for Your Mining Job." Request Form 12932.

CYANIDATION: American Cyanamid Company announces its most recent technical publication, "Mineral Dressing Notes," Number 17, entitled "Chemistry of Cyanidation." This new issue in their series of technical publications is organized in four sections: Fundamentals of Cyanidation, Zinc in Cyanidation, Copper in Cyanidation and Iron in Cyanidation. Copies are mailed free upon request.

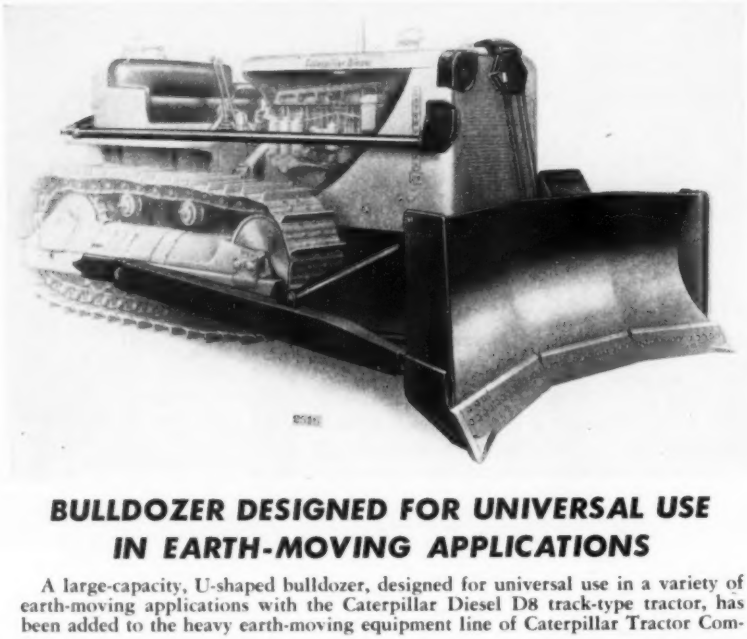
SAND PUMP: Pumping problems created by pulps carrying sand and other abrasive solids are answered in Western Machinery Company's newly released bulletin on the WEMCO sand pump.

TRICONE MILLS: A catalog describing the operating principle of the Hardinge Company tricone mill, including a discussion of ball segregation, design features and performance data, has been released. Write MINING WORLD for your bulletin, AH-414.

ROTATING EQUIPMENT: A new 24-page booklet contains a series of articles written by Fraser Jeffrey, assistant to Allis-Chalmers' chief electrical engineer, who authoritatively describes preventive maintenance and machine repair of electrical machines. Copies of "Care of AC Rotating Equipment," O5R7417, are available upon request from MINING WORLD.

CONCENTRATOR: The Weinig Concentrator effecting a gravity separation in size ranges from ¼-inch to 35 mesh (between flotation and sink-float ranges), is described in Colorado Iron Works Bulletin No. 50, available upon request from MINING WORLD.

FAULT FINDER: A lightweight fault finder that permits quick location of short circuits and open-type faults in cable is described in a bulletin issued by the Mines Equipment Division of Joy Manufacturing Company. Write MINING WORLD for a copy of Bulletin F-28.



BULLDOZER DESIGNED FOR UNIVERSAL USE IN EARTH-MOVING APPLICATIONS

A large-capacity, U-shaped bulldozer, designed for universal use in a variety of earth-moving applications with the Caterpillar Diesel D8 track-type tractor, has been added to the heavy earth-moving equipment line of Caterpillar Tractor Company.

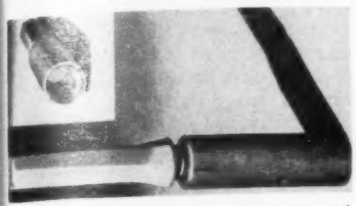
The new design permits long-haul pushing of loose material with minimum end spillage when bulldozing straight ahead. It is an excellent tool for stockpiling, handling large-capacity loads, and allowing good maneuverability. The U-shaped bulldozer does smooth finishing, quick backfilling, and pioneering and side hill work. In addition, its U-shaped blade makes it a convenient tool for felling trees. The complete unit is cable-controlled and consists of blade, push arms, trunnions, cable, sheaves, and sheave brackets.

Long Dipper Stick for Stripping Shovel

Designed to simplify stripping operations, especially where the spoil bank is high and well away from the shovel, Thew Shovel Company's new stripping front end can be readily attached to the popular, hydraulically coupled 820 shovel. Using a 1¾-yard dipper, a 34′ boom at 55°, and equipped with the long 27′ dipper stick, the new front end allows digging heights up to 43′-5″ and dumping heights up to 33′-11″ at a maximum ground-line radius of 31′-8″. A power-operated tilting and folding gantry, to eliminate interference with the long dipper stick, is used with the new front end. Strippers and shovel men should get free information on "Thew Stripping Front End" from MINING WORLD.

Simple Fishing Tool Recovers Broken Steel

Miners who have lost costly carbide and other bits in drill holes by a breakage of drill steel will welcome Rock Bit Sales & Service Company's new Hole-Saver. The Hole-Saver is an outside fishing sleeve



which is attached to conventional steel (Rock Bit R-1, R-2; Timken H or D) and then is force-threaded in a left-hand direction onto the broken end of any of the following sizes lost steel: (a) 7/8" Hex. or Q.O., 1" Hex. or Q.O., and 1⅛" Round; (b) 1¼ or 1⅛" Round.

For further information on the "field proved and rigorously tested" Hole-Saver, a tool which saves both the bit and the hole, get information "Rock Bit Hole-Saver" from MINING WORLD.

New "Superior" Gyratory Has Cast-Steel Parts

Featuring cast-steel parts with high impact strength and easy weldability, the new Allis-Chalmers "Superior" line of gyratories was designed to provide increased crushing capacity and a wider range of easy adjustments. Built of cast-steel, the top and bottom shells and the large spider hub have a strength in keeping with that of the forged-steel main shaft. Resetting of concaves to offset wear of concaves is held to a minimum by raising the main shaft to bring the muller closer to the concaves.

Crushermen will receive further information on this new line of 11 heavy and standard duty primary and high-capacity secondary crushers in answer to their request for information "Superior Crushers" from MINING WORLD.

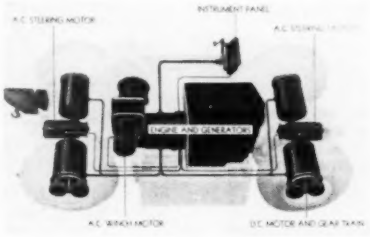
Compact Battery Trammer For Small Drifts

The Locomotive and Car Equipment Divisions of General Electric Company announce the availability of a new, compact, 1½-ton battery-powered trammer for haulage duty in metal mines with restricted clearances. Features of the new unit are as follows: Track gage, 18 to 24 inches; length, 71½ inches; width, 35-9/16 inches; height, 38⅛ inches with standard battery; drive, two axle; drawbar pull, rated 400 pounds, maximum 750 pounds; speed, rated 3 mph., maximum, 7 mph.; bearings anti-friction throughout; control, 4-step with limited mechanical braking on first two steps; headlight, sealed beam; frame, welded steel.

Equipped with a folding cab to permit loading on small mine cages, the new GE trammer provides power, speed, and control in a unit to fit your small haulage levels.

Diesel-Electric Drive For New Haulage Unit

A rubber-tired tractor or power source with no clutch, no transmission, and no differential, the Tournatow, newly developed by R. G. LeTourneau, Inc., is a diesel electric unit with a wide field of application. A General Motors 671, 6-cylinder,



2-cycle diesel engine drives an ac. generator, a dc. generator, and a 12 cu. ft. air compressor. Power from the generators is fed to an electric motor mounted in each wheel to drive each wheel separately.

Usable as a tractor, as a source of either ac. or dc. power, or as a source of air, the Tournatow will be produced on a large scale, but with availability limited by copper and other critical material supplies. Get free information on this radically new power unit by requesting information "Tournatow" from MINING WORLD.

Stephens-Adamson Offers Circular Bin Discharger

The Stephens-Adamson circular bin discharger is described in a recent bulletin issued by the company. These bin dischargers are designed for handling pulverized, granular, glutenous and soft lump materials that may puck or arch and refuse to discharge by gravity, or may aerate and surge through openings too rapidly.

Two types are available, one with flight fingers above the bin bottom, the other with flights above and below the bin bottom. These flights carry material to discharge openings and, in the case of the two-stage unit, give a measured flow. A hood over the discharge opening of the single-stage unit will also give a controlled volume of flow. Either of these units may be equipped with a rotating arch breaker. Write MINING WORLD for a copy of this bulletin.

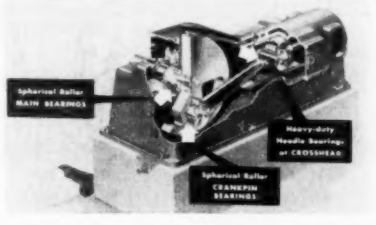
Compressed-Air Portable Lighting System

A new low-voltage portable lighting system for underground mining or surface construction work, the Joy-Lite, has recently been announced by the Joy Manufacturing Co., Pittsburgh, Pa. Driven by compressed air, the Joy-Lite will develop an output of 250 to 280 watts (power to operate four high-powered sealed-beam flood or spot lights) with air consumption not exceeding 25 cfm. For protection from dirt and dripping water, the generator is mounted in a steel box which is equipped with a carrying handle for easy portability. Lamps have tripod swivel bases, which can be used as column clamps, and hooks which serve as hangers. Complete details on this compact, 48-pound unit are yours upon request for "Joy-Lite Bulletin 87-I" from MINING WORLD.

Compressors Use Roller Bearings at Key Points

With its new Class O-CE heavy-duty compressors, the Chicago Pneumatic Tool Company is first to meet the demand for a motor-driven, horizontal, duplex compressor that utilizes roller, anti-friction bearings in the running gear.

According to the manufacturers, the advanced design of the Class



O-CE made possible by the recently developed oil-injection system of bearing removal, results in self-adjustment of bearings, longer life, smoother operation, full-flood lubrication, ability to use one-piece crank discs and connecting rods and easier maintenance.

For a 28-page preview of this new line of CP compressors, available in sizes from 350 to 10,000 cfm. at 80 to 125 psi, get your copy of "Bulletin 726-5-MW" from MINING WORLD today.

BOOK REVIEW

GEOCHEMICAL AND GEOPHYSICAL PROSPECTING AT CAPTAIN'S FLAT. By H. F. Conaghan and W. E. Fl[illegible]ett. Australia Department of Mines, Geological Survey File Report, New South Wales, 1949.

Geochemical and geophysical work was carried out at Captain's Flat in order to investigate the possibilities of modern geochemical methods. In the district the Lake George Mines Pty., Ltd., is at present engaged in mining three ore bodies which form disconnected lenses over a length of 3,000 feet along a major shear zone.

Geochemical methods involved the determination of copper, lead and zinc by dithizone methods in soil and outcrop samples. Self-potential measurements were made over the areas examined and magnetometer readings over a small portion of one area. Maps were drawn showing geological data and surface, and geochemical and geophysical contours.

In one of the areas examined, both geochemical and geophysical data indicated the presence of mineralization and drill sites were selected. In a second area no geochemical anomalies were obtained, but high negative self-potential gradients were thought to be due to the presence of graphitic slates. A site was selected for shallow drilling to determine the cause of the self-potential anomaly. In the third area, small narrow geochemical anomalies and the absence of self-potential anomalies substantiated geological evidence that important mineralization at depth was possible. Geochemical surveys along two of the streams draining the area were made, but the results obtained were not significant.

In the three areas examined, reasonable agreement was obtained between geochemical, geophysical, and geological findings.

* * *

MINERAL COMMODITIES OF CALIFORNIA. Prepared by the staff of the California Division of Mines under the direction of Olaf P. Jenkins. With 18 contributing authors. San Francisco, California. Bulletin No. 156. 1950. 443 pp., 17 plates, 34 charts. $2.00.

This volume reviews, by means of separate technical papers, the entire mineral industry of California. More than 80 different kinds of raw materials are discussed, nearly all of which, under favorable economic conditions, are capable of profitable development and use in industry. Also included is a map showing the general distribution of mineral deposits, on the back of which is a description, accompanied by a map, of the geomorphic provinces of the State.

As a handbook of useful knowledge concerning the mineral resources and industry of California, Bulletin 156 serves a very broad field of interest; producer, explorer, and user of mineral materials, as well as the general public seeking authoritative information, will find this volume invaluable. It is very suitable for a college text on economic geology. Its appearance is particularly timely since this is a period of industrial expansion in California, and a time when many different kinds of minerals are sought for national defense.

Copies of any of these books may be purchased from MINING WORLD, 121 Second Street, San Francisco, Calif.

precipitates—NORTHWEST

ROGER O. OSCARSON has resigned as secretary-manager of the Mining Association, Spokane, Washington, in order to become acting manager of the new office opened at Spokane by the Department of Commerce, Field Service, to serve the National Production Authority.

Openpit Copper Mining Planned in Idaho Co.

Ross R. Brattain of Mercer Island, Washington, has formed the Circ-Twins Mining Corporation to develop and mine by openpit methods the Petsite copper property just south of the old Oregrande gold camp in southern Idaho County, Idaho.

Brattain, who is also connected with the Penman Mines Corporation, now developing the adjoining Homestake gold mine, says the Petsite group consists of 14 claims and a millsite. Three trenches have been cut in an intrusion of rhyolite, 800 feet long from east to west and 550 feet wide, and surrounded by granite. Enough copper ore has been exposed, he reports, to provide 30 months millfeed at a rate of 150 tons daily.

Analyses of the ore made by Dean A. W. Fahrenwald of the University of Idaho and his staff show that it contains malachite, azurite, cuprite and some chalcocite.

The new company has built a road to the mine and expects to start development work with power shovels this spring. The millsite is by Badger Creek, 400 feet west of the deposit at an elevation of 4700 feet. The property had originally been developed by the late Frank Peck by tunneling and trenching to reach gold and silver ore.

Bonanza Lead and Lovitt Gold Mines Optioned

Two Washington properties recently have been reported leased to A. M. McDonald, mining representative. One of the properties is the Bonanza lead mine in Stevens County, Washington, which has been leased for a period of one year with an option to buy at the end of that time if development is satisfactory. Owners of the Bonanza are Ira M. Hunley and Earl B. Gibbs. Diamond drilling is said to be under way now.

The other company with which McDonald reportedly has made a similar agreement is the Lovitt Mining Company, a gold producer near Wenatchee, Washington. This company has been successfully operating the Wenatchee Mining Company's Golden King mine under lease.

Purchase prices for the properties have been rumored to be $1,000,000 for the Lovitt and $2,000,000 for the Bonanza, but the amounts are unconfirmed.

Albert M. Nash, mining engineer of Clark Fork, Idaho, and his associates have leased the *Black Horse* group of lead-zinc claims east of Murray from *Senator Silver-Lead Mining Company* for 15 years. Now incorporating under the name of *Black Horse-Paragon Mining Company*, Nash will begin work as soon as weather permits. Power will be brought into the property, a compressor installed, and probably a mill built.

Driving on the 1800 level, *Silver Dollar Mining Company's* exploration crews have encountered a vein at the 3,200-foot point, which President Elmer E. Johnston says is "about five feet of silver-bearing gray copper vein-material, assaying about 12 ounces in silver per ton." The new ore is in the *Western Star* claim near Wallace, Idaho; one half interest in the claim is owned by *Silver Summit Mining Company* and *Polaris Mining Company* and the other half by *Hayden Hill Consolidated Mining Company* on whose properties Silver Dollar has a long-term lease.

The possibility of proving up large amounts of low grade silver ore at the old boom town of Mineral near Weiser, Idaho, is being investigated by Kenneth Steck, E. W. Horner and Lee Thorsen, partners, who are working the property. Four carloads of sorted ore, recently shipped, were said to assay 33 ounces of silver, 2.5 percent copper and an unreported zinc-lead content. The partners hope to finance a mill to treat large tonnages of low grade silver ore and may also treat the low-grade copper ores in the Snake River's Hell Canyon area. Although the latter would be costly, the present copper demand might make operations feasible.

Sidney Mining Company's three-compartment shaft is going down rapidly under the direction of Malcolm Brown, general superintendent. Now 200 feet below the Red Cloud (No. 9) level, where a station will be cut and a crosscut extended to the orebody, the shaft will be continued indefinitely and levels cut 200 feet apart. The mine is at Kellogg, Idaho.

Alfred Roeder of Middleton, Idaho, advises that he and his son, who have been prospectors for 20 years, have now become mine owners and hope to become operators soon. They have staked several claims in the monazite district near Cascade, Idaho, and are building "the world's smallest bucket-line dredge—30 yards per hour capacity," with which they propose to recover monazite, garnet, ilmenite, and zircon. Roeder's son is said to be the discoverer of monazite in the area.

Idaho Goldfields, Inc., through President W. M. Fredericks of Spokane, has announced the discovery of a lead-carbonate vein near the tunnel being driven to intersect the downward extension of the Gold vein in the mine near Kellogg, Idaho. The unexpected vein was found about 60 feet up the hillside from the tunnel.

The *Atomic Energy Commission* revealed in a recent bulletin that more uranium than initially reported has been found in the *Sunshine* mine at Kellogg, Idaho, but that the commercial possibilities of the deposit have not been explored fully. The pitchblende, generally associated with pyrite, tetrahedrite, arseno-

CORRECTION

On page 30 of the December, 1950, issue, MINING WORLD erred in stating in the article about the Calera Mining Company that "Reserves now blocked out are sufficient to last 19 years."

pyrite, siderite, and hematite, has been found on the 3000, 3100, and 3700 levels. The original discovery was made in July, 1949, by Ernest E. Thurlow, AEC geologist, Raymond Robinson, chief geologist of *Sunshine Mining Company*, and Thomas Gillingham, geologist of *Bunker Hill*.

Exploration by tunnel in virgin ground of *Inspiration Lead Company*, Osburn, Idaho, has resulted in a showing of mineral similar to the orebearing deposits in that area, and is considered promising by company officials. Work will have to be continued further before exact value of the formation can be determined. Costs of exploration are shared with *Silverore Mines*, whose claims adjoin Inspiration's toward the south.

MONTANA

Described as one of the outstanding small mine operations of the state, the *Cornucopia* gold mine in the Virginia City district, Madison County, Montana, has repaid its investors after 32 months of operation which began as a leasing venture by Henry A. Shute in 1947. He and his associates currently are shipping about three carloads of ore per week; enough ore is thought to be available to continue shipments through the winter.

The old *Cumberland* mine near Castle, once acclaimed as containing one of the largest silver-lead orebodies in the state of Montana, has been closed down permanently and the timber and machinery offered for sale. Efforts of several concerns to find new orebodies in the mine in recent years have been fruitless.

The *Elkhorn Mining Company* of Boulder, Montana, has found the scintillometer to be of great value in indicating placer gold channels because of its reaction to the radioactive minerals (monazite) in the black sands. The company carries the instrument over placer areas, and readings are recorded on a grid sheet. Wade V. Lewis, president, explains that the differences in radioactivity at certain points clearly indicate the line of the channel beneath the water.

Regular shipments of argentiferous lead carbonate ore are being made from the new shaft of the Melrose, Montana, mine of the *Commonwealth Lead Mining Company*. The ore is being mined from fissures and replacement deposits in the Calvin limestone about 1,200 feet north of previous mine workings. The company is planning to install new equipment and employ additional men in order to increase production. J. H. Featherstone is president of the company, with headquarters in the Felt Building, Salt Lake City, Utah.

Operations of the *Porter Bros. Corporation* on the Last Chance placer gold deposits north of Helena, Montana, have been closed down. The deposit had been worked for about 14 years with a Yuba connected bucket line floating dredge. The company has other mining and contracting interests in several states, however. Robert P. Porter is president.

Victor Chemical Works recently shipped 700 tons of phosphate rock from its mine near Maiden Rock, Montana, to its furnace plant at Mt. Pleasant, Tennessee, for experimental purposes. The company is building a $5,000,000 plant at Silver Bow, Montana, to produce elemental phosphorus. Maiden Rock phosphate will be diverted to this plant when it is completed. William Anderson, Jr., of Butte is in charge of mining operations, and exploratory work and development by drifts is now under way to prepare for the eventual mining of 500 tons daily.

President W. Randolph Green of *Mines Management, Inc.*, Chronicle Building, Spokane, Washington, reports that drilling at the company's *Advance* mine in Stevens County has been discontinued (after good results) and that underground diamond drilling at the *Iroquois* mine has begun. Some drifting and crosscutting at the latter property also is contemplated during winter operations.

Reopening of the old *Silver Trail* mine in the Northport mining district, Stevens County, Washington, has resulted in recent ore shipments of silver-lead-zinc concentrates said to be high grade. The property was discovered in 1885 and has produced intermittently since then. In 1949 six partners reopened and cleaned out the old workings, built ore bins and installed new machinery. Since then 100 feet of new tunnel has been driven, making available a good deposit of ore; initial shipments, including some dump ore, were processed at the *Young America* mill at Bossburg. Partners are Robert Ramser, A. B. Sylvester, Orville Dilly, Fred Schwank, W. T. Ramser and Francis Carrol.

The *Horseshoe Basin Mining and Development Company* is opening a gold-copper-silver-lead property at an elevation of 7,000 feet near Stehekin, Washington, at the head of Lake Chelan, and is said to be planning to construct a mill in the spring. The company recently elected Norman D. Lindsley as a director. He formerly was with the *Howe Sound Company* and also served as engineer for the *Bonanza* and *Old Dominion* companies near Colville.

The *Admiral Consolidated Mining Company*, which resumed production from its mine and mill one mile north of Leadpoint, Washington, last fall, reports $33,353 net smelter returns between the time operations began and the 1st of December. The concentrates (zinc, lead-silver) are shipped to the *Consolidated* smelter at Trail, B. C.

As a result of the discovery of uranium in the *Bella May* mine of the *Metaline Mining and Leasing Company*, Metaline Falls, Washington, investigations were made in other mines of the district leading to the finding of a radioactive mineral in *American Zinc, Lead and Smelting Company's Grandview* mine. The mineral was found in seams along the 200-foot level. Ernest Thurlow, head of the U. S. Atomic Energy Commission's office at Spokane, said further investigations were being made.

The University of Washington is offering fellowships in the School of Mineral Engineering for research in coal and nonmetallics in cooperation with the Northwest Experiment Station, U. S. Bureau of Mines. The Engineering Experiment Station in cooperation with the School of Mineral Engineering is offering fellowships in ceramics and metallurgy.

An 18-foot showing of zinc-lead has been encountered in *Metaline Contact Mines'* property near Metaline, Washington. Crews employed by *Sullivan Mining Company*, the developing company, have been raising from the 6,600-foot point in the Sterling tunnel, which is owned and has its origin in *Metaline Mining and Leasing Company* ground, but extends into Contact ground. The raise, at a 55° angle, was up 394 feet when the ore was found. A parallel raise, 15 feet away and designed as a future manway, is up 418 feet and has not cut ore. According to Cline Tedrow, engineer in charge, the zinc-lead showing is probably the edge of a lense formation typical in the area.

The *Slate Creek Mining Company* is preparing to start its mill running at a rate of 100 tons per day this spring at its Whatcom County, Washington, property. The company owns 42 claims in the Slate Creek mining district and these include the *Eureka* mine, the old town of Barron, the *Allen Basin* group and the *Goat* mine. Development through the past few years has opened orebodies on the first and second levels with sufficient ore reported for three years of milling. Exploration is about to begin on the third and fourth levels which show promise of more ore, according to Harry P. Kramer of Seattle, president.

The Goldfield Consolidated Mines Company resumed operations at the *Deep Creek* mine several months ago under the management of T. Higginbotham, Colville, Washington. Lead-zinc ore from both the mine and the *Anderson* openpit is being treated at the company's 300-ton *Sierra Zinc* mill near Colville. A power shovel works the Anderson pit and the ore is trucked to the mill. Half of the tonnage comes from the mine and half from the pit.

precipitates—SOUTHWEST

Minerals for Defense to Be New Mexico Feature

The 1951 meeting and convention of the New Mexico Miners & Prospectors Association will be held at the Hilton Hotel at Albuquerque, on February 15, 16 and 17. Because of the recent uranium developments in New Mexico, an important paper will be given on the Grants deposits and a second paper will outline uranium occurrences and guides for prospecting.

A discussion and question panel on the "Mining Industry in Defense Mobilization" will feature speakers from Washington, D. C., and from industry on the following subjects: procurement, controls, defense orders, mining loans and the DMA.

The mining-company suppliers will provide an evening party again with refreshments and entertainment.

The convention is designed to serve every segment of the mineral industries of New Mexico and adjoining states. Early registrations indicate a record convention crowd.

Santa Fe Railway Testing New Mexico Uranium Find

Publicity of what may be an important uranium find near Grants (see Mining World, November, 1950) touched off a minor rush in December. Reports said many attempted to get permission to prospect in the vicinity of the discovery.

However, the Atchison, Topeka and Santa Fe Railway System's subsidiary, The Santa Fe Railroad Company, which holds mineral rights on much of the ore-bearing land is spending a sum of about $50,000 to survey the find. Presumably, if the tests show the deposits to be worthwhile, the company will develop the discovery itself, probably through contractors. The tests will consist of drilling and pitting over a 90-acre area.

Meanwhile, Blair Burwell, manager of Climax Uranium Company at Grand Junction, Colorado, warned against exaggerated statements concerning uranium discoveries in the Plateau area. He reported that geologists of his firm, other companies, and the AEC have been studying the region for months and "more exploratory work is required to justify any estimate or evaluation of the find."

Concentrating Plant May Be Built in Death Valley

George Lippincott, owner of the Sun Battery Company, may erect a concentrating plant at Bonnie Clair, Nevada, to treat lead-zinc ores. Extensive development of Lippincott's 18 lead claims in the Ubehebe district has been under way since the war, and a local concentrating plant would cut transportation costs to Salt Lake smelters greatly.

Another consideration is that a new paved road is being built to Scotty's Castle in Death Valley. The plant, if erected, would be along this road and would be easily accessible to other lead-zinc mines in the district for custom milling.

Miners in the area think that completion of the road will also stimulate mining activity around Tin mountain, where large metal reserves are thought to exist.

Two copper properties in Arizona are being examined by engineers of the *Central Eureka Mining Company*, which operates the *Central* and *Old Eureka* gold mines at Sutter Creek, Amador County, California. According to J. D. Swift, president, the company is thinking of diversifying its operations.

George W. Campbell and Son have begun shipping car lots of siliseous gold ore to the *American Smelting and Refining Company* at Hayden, Arizona, from their *Bunker Hill* mine near Salome, Arizona. The mine is also a good scheelite producer, and this ore is treated and concentrated at the mine. The Campbells plan to mine and mill about three units of scheelite concentrate daily.

The *Fluorspar Producers Corporation*, which recently purchased the *Lone Star* mine near Benson, Arizona, is producing about 150 tons of fluorspar monthly. In addition, the main shaft is being deepened. Five men are employed under the direction of J. A. Ross, superintendent. Frank R. Wicks, 108 West Sixth Street, Los Angeles 14, California, is general manager.

The *Gila Asbestos Company* of Globe, Arizona, is making regular shipments of high-grade asbestos fiber from its properties near Young. Production is at the rate of one ton daily of No. 1 grade and three-quarters of a ton daily of the No. 2 grade. The mine crew varies from 20 to 40 men, depending on the work load. As each shipment is prepared, James F. Hopkins of the U. S. Bureau of Mines at San Francisco, goes to Young to inspect the fiber and send samples to asbestos processors. The company has offices in Globe and maintains two warehouses where more than 60 tons of material are now stored. The owners and operators of the property are E. S. Phelan, O. M. Marshall, and George Kohl.

A prospect shaft has been started by the *Sunset Mines, Inc.*, Sells, Arizona, on its group of eight gold claims in the Cababi mining district of Pima County. John Liuzza is president and manager.

Production at the rate of 500 tons of lead-silver ore monthly is reported by the *Scribner* mine near Elfrida, Arizona. While the principal production comes from square set and cut and fill stopes, some ore is being obtained through salvaging pillars in old stopes. A mine crew of 14 men is employed under the direction of Robert Mitcham, Box 101, Elfrida. The Scribner is owned by Dr. Edwin Larson, 4032 Wilshire Boulevard, Los Angeles.

The *Hillside Mining and Milling Company* of Bagdad, Arizona, currently is producing 500 tons of lead-zinc-silver-gold ore monthly from its mine. Operation of the mill is on a 24-hour basis in order also to mill 150 tons daily on a custom basis for mines in the Yavapai county region. The company mills each customer's ore separately, changing flow sheet and reagent setup designed especially for each case. This policy permits greater net returns per lot. Hillside employs 20 men in the mine and 10 at the mill. E. G. Green is superintendent.

Development of the *Bronkow* mine, Cochise county's oldest recorded mining claim, which dates back to 1853, has been started. Lead-vanadate with a trace of gold and silver has been reported found in the old workings by Jules Gallagher, now working the *Gallagher-Vanadium and Rare Minerals Corporation's* mine which adjoins the Bronkow. The mines are near Tombstone, Arizona.

Marshall Bartlett of Casa Grande, Arizona, is said to have discovered a large manganese deposit on the north side of the Sheridan Mountains on the Papago Indian reservation.

A lease and option on the old *Kay* copper mine, located in the Tip Top mining district about 50 miles north of Phoenix, Arizona, has been acquired by the *Shattuck Denn Mining Corporation*. Exploration work will be directed by H. F. Mills of Prescott, manager of the corporation's *Iron King* mine. Shattuck Denn proposes to dewater the 1,200-foot shaft and has a small crew at work installing a hoist and compressor and making preliminary shaft repairs. Frank Garrett, formerly of the Iron King, is in charge.

John Rohde, developing his prospect four miles north of Quincy, California, has sunk an inclined crosscut for a distance of 180 feet and now has 75 feet to go before intersecting the vein. The vein is 60 feet wide—the total including quartz stringers and country rock—with a four-foot stringer of "picture rock" quartz next to the footwall. Gold in the vein is free-milling and Rohde reports good recovery of coarser gold but poor recovery of finer gold in sluicing tests which he ran at the time of discovery, some three years ago. Therefore, if the vein is reached and looks promising enough he plans to install a 12 or 30-ton mill at the property.

Tom Bignich and Ross Finley of Bishop, California, are making regular shipments of lead-silver ore from the *Minnietta* mine to the Selby smelter of *American Smelting and Refining Company*. They also are producing a small tonnage of concentrates from a new gravity plant at the property. The Minnietta is on the east slope of the Argus range in Inyo County, California, and is leased by the two men from Helen Gunn of Independence.

Substantial operations are being planned for the *Chloride Cliffs* mine in Inyo County, California, just west of Beatty, Nevada. Three converging gold-lead veins will be developed. Development has already begun at the adjoining *Hawkeye* group which is under lease to Harry Fischer and J. L. McPherson of Amador County. The Hawkeye is owned by the Revert interests.

Full-scale operations are said to be planned this spring by the *Fresno Mining Company* at its *Strawberry* tungsten mine near Yosemite National Park, Madera County, California. A new crushing unit is being installed in the mill and underground development is under way now. David W. Baker, consulting mining engineer of Reno, Nevada, is general manager and consulting engineer; M. Richardson is mine superintendent, and Homer Salisbury is mill superintendent.

Buckeye Creek Placers is working gravel 8 to 12 feet deep lying on a greenstone bedrock in Trinity River at Honest Bar, California. V. P. Bennett and associates are the operators. The Lima dragline being used has a $1\frac{1}{2}$ cu. yd. capacity bucket. The washing plant is built on steel pontoons which make a barge 36 feet wide, 46 feet long, and 42 inches deep. The entire outfit was moved to the present location from Canyon Creek.

The *California Liberty Mine Company, Inc.*, which began last year to rehabilitate the *California Liberty* mine north of Dobbins, Yuba County, has installed electrical machinery throughout and has completed 150 of 300 feet of shaft sinking. An old 300-foot shaft on the property struck a gold ledge at this depth. A station will be cut at the 300 level of the new shaft and a crosscut driven to the ledge. Work is on a two-shift basis and will be increased to three shifts soon. Floyd J. Wilson of Denver, Colorado, is president of the company.

An asbestos products plant may be built at Santa Clara, California, by *Keasbey & Mattison Company* of Ambler, Pennsylvania, according to reports. The company is negotiating for a 26-acre site in the city and when the plant is constructed will use asbestos from Canada, South Africa and Southern Rhodesia.

Because of the present demand for tungsten, *Getchell Mine, Inc.*, Red House, Nevada, has decided to start mining tungsten-bearing ore on its properties, according to reports. The company has been producing gold since 1936 but has four tungsten deposits which can be developed.

BARITE MILL ERECTED IN NEW MEXICO

The Irvin & Bishop mill, pictured during construction, has been completed near San Antonio, New Mexico (see November 1950 MINING WORLD). The structure at the right houses a Raymond, five-roller, high-side grinding mill to be used to process barite. Erected in the foreground and not showing in the picture are dumping ramps, primary crusher, and part of the conveyor to the head of the mill. Full-scale mining and milling operations are beginning for production of high-grade barite and lead concentrate.

Production of fairly high grade silver ore is reported from the old *Silverado* mine, recently reopened after 10 years' idleness by Norman Annett. The mine is in the Sweetwater region south of Wellington, Nevada.

Andy Willis, Dave Stonebraker and E. T. Dorsett report that radioactive and vanadium minerals have been found in their *Mohawk* gold mine in western Esmeralda County, Nevada. The men have been rehabilitating the mine for immediate operation. Track is being laid in the tunnel and mining equipment has been installed. Arrangements are being made to mill the gold ore at the *Deep Mines* mill at Goldfield. No plans have been announced regarding the radioactive material.

A compressor and power drills are being installed and construction of camp buildings begun at the *Juanita* gold mine in the Columbia district 98 miles northwest of Winnemucca, Nevada. Early underground work is said to be planned. The mine is developed by a 104-foot shaft and 615-foot tunnel. Control of the mine is said to have passed from the *Juanita Mining Company* to *Golden Century Industries*, both of Salt Lake City, Utah.

At Gabbs, Nevada, *Basic Refractories, Inc.*, has fired the new kiln in its $2,500,000 magnesite plant, according to Norman E. Hanson, plant manager. Plant output will be about 100,000 tons of magnesite annually. The 390-foot kiln uses 100 tons of coal per day.

Further development work is planned on a gold strike made at the *Arista Gold Mining Company's* property 10 miles south of Beatty, Nevada. Ore samples have been sent to *Kennecott Copper Corporation's* Ely smelter for testing. W. H. Callicott controls Arista.

The *Hamilton Development Company* is driving a 500-foot tunnel into virgin ground at its property near Ely, Nevada. Officials of the company hope to cut extensions of rich silver veins mined in the 1860's and 1870's.

In two months 87 mining claims have been filed in Esmeralda County, Nevada, and no abatement is in sight. Among those filing are Lee Hand and Anton Johnson, who have located 19 claims near Millers; C. G. Colley, who located 18 copper-bearing claims in the Jackson Mountain district; Fred and Homer O. Gilbert and Ed Heagney, who have re-located the *Tip Top, Rim Rock* and *Big Boulder* claims a mile from Gold-

field. The county also announced that Victor C. Anderson has obtained a prospecting permit on the *Sunrise* and *Central* claims in the Goldfield district. Anderson bought three claims in the Gold Mountain mining district recently, besides.

Combined Metals Reduction Company is milling from 1,000 to 1,100 tons of its own and custom lead-silver-zinc ore at its Caselton, Nevada plant. Construction of its concentrator at Pioche and a refinery near Henderson is progressing toward the scheduled opening in 1951.

The Colorado River Commission and the *National Lead Company* have signed the contracts necessary for National Lead to start its proposed $2,000,000 plant construction for the manufacture of titanium metal at Henderson, Nevada.

NEW MEXICO

The *Atwood* copper mine, formerly run by C. H. and S. H. McIntosh, is now being operated by Ira L. Mosley of Lordsburg, New Mexico. Production is about half of the former rate. Low-grade copper is being produced for flux in *AS&R's* smelter at El Paso, Texas.

The *Shingle Canyon* mine, owned by the *United States Smelting, Refining & Mining Company,* is being operated by D. Bruce Leake, former state deputy mine inspector in the Silver City, New Mexico, area. The mine, a World War II producer that shut down during the recent metals price slide, now is producing a reported 50 tons of zinc ore daily, which is being milled by U. S. Smelting. A six-man crew is employed.

The *Harding* mine near Dixon, New Mexico, is shaping up as one of the nation's biggest 1950 beryl producers, on the basis of preliminary figures. The mine, a microlite-lepidolite-beryl producer during the war, was closed in 1948 and 1949. Since reopening Arthur Montgomery, owner, has directed the mining of a non-crystalline beryl mass that has yielded some 200 tons, already shipped. Production will continue during this year. Meanwhile the *New Mexico Mining and Contracting Company* of Albuquerque, which has a contract with Montgomery, has been mining lithium-bearing ore (lepidolite) and shipped more than 1,500 tons last year. Officers of the company are C. J. Barnhisel, president; John Wood, vice president; and E. P. Chapman, Jr., secretary-treasurer.

Development work in the Pinos Altos mining district is being continued by B. E. Prosser of Silver City, New Mexico, owner of a large group of lead, zinc and copper claims in the section. Work includes shaft-sinking and tunnel-driving.

Shipments of a carload of zinc-lead ore weekly from the *Waldo* lease of the *American Smelting and Refining Company,* in the Magdalena district of New Mexico, to its mill at Deming recently were resumed, and several weeks later shipments of a weekly carload of lead-carbonate ore also were commenced. Operations at the Waldo had been suspended for about a year. Bob Chamberlain and Tom Scaraccini are directing a crew of eight men at the mine.

Several cars of lead-carbonate ore have been shipped from the old *Juanita* mine in the Magdalena district during the past few months by Dave and Fidel Tafoya.

precipitates—CENTRAL and EASTERN

Lead Strike Reported at Ponca City, Arkansas

A lead ore strike was made in Arkansas recently, near Ponca City, when Harold Jones, son of Judge Will Jones, uncovered a chunk of galena while bulldozing a road. Examination of the spot revealed that there was a well-defined vein of ore running across a 40-acre tract. Young Jones, his father, Lennis House, Audie Ewin and Wilbur Sloan immediately formed a company which leased the land and mined some ore from a shallow deposit in red clay. A load was taken to Joplin, Missouri, 75 miles southeast, sold, and found to be high grade.

In working the deposit Jones cut a ditch 100 feet long, eight feet wide, and four to six feet deep, uncovering ore most of the way.

Meanwhile Floyd Kimbley of El Dorado, Kansas, has leased 400 acres in the Ponca vicinity and started prospecting, and several other leases have been reported. Newton County, Arkansas, actually has long been a producer of zinc and lead ores, mostly from shallow deposits.

Record Iron Shipments Bring More Ship Orders

The movement of iron ore via the Great Lakes has set records this year, and the increased demand for iron ore by the steel industry has brought about further orders for ore carriers from several more companies.

Orders for ships for the 1951 and 1952 ore seasons have been made by Cleveland-Cliffs Iron Company which has bought the 454-foot Victory ship, Notre Dame Victory, from the Maritime Commission and will have it converted to a 619-foot freighter by July 1, 1951. Pioneer Steamship Company has ordered a 640-foot freighter with a capacity of 16,000 tons to cost $5,000,000. The company handles ore under contract to iron mining companies. National Steel Corporation has ordered a 690-foot carrier with a beam of 70 feet and an ore capacity of 19,500 gross tons at a draft of 24 feet. This ship will be launched in the summer of 1952.

Total Lake Superior vessel shipments amounted to 78,205,681 tons during the 1950 season. Of this amount the Oliver Iron Mining Company shipped 35,400,000 tons or 45.265 percent of the total. In 1949 total lake shipments (including Canadian) amounted to 69,556,269 tons.

Oglebay to Build Pilot Plant at Babbitt

Oglebay, Norton & Company, as operating agents for the Reserve Mining Company of Cleveland, will build a $6,000,000 taconite pilot plant near Babbitt in 1951 preliminary to full scale beneficiation later at Beaver Bay, Minnesota. H. S. Taylor, president, said the Babbitt pilot plant will be constructed with equipment of identical size as one section of eight that will eventually comprise the initial Beaver Bay project of about 2,500,000 tons annual production. Final cost of this project is expected to be about $160,000,000.

Frank J. Smith, vice president also announced that Oglebay, Norton had leased offices in the Christie Building, 120 N. Fourth Avenue West, Duluth, as headquarters for its Lake Superior area taconite and mining operations. The company will move its Montreal, Wisconsin office to Duluth early this year.

The *Ozark Ore Company*, an *M. A. Hanna Company* operating subsidiary, is installing a new 60-inch WEMCO classifier for dewatering jig tailing at its Iron Mountain, Missouri, concentrator. W. F. Shinners is superintendent.

The slowness with which the lease and building owners have been evacuating the danger zone of Picher, Oklahoma, has caused the *Eagle Picher Mining and Smelting Company* to advance financial aid to the owners so that there will be no serious accidents in case expected cave-ins should occur. The surface lease holders were notified to remove their buildings several months ago when the company engineers pronounced the area unsafe because of mining operations underneath it. Concrete reinforcements did not seem to relieve the situation. The suggestion that the stopes be filled with tailing was discarded by company engineers who found the cost would be more than $100,000. Elmer Isern, president, issued the statement that the company had granted limited aid to the lessees.

The *United States Steel Corporation* has decided to merge four of its wholly-owned subsidiaries into a single operating company to be called the *United States Steel Company*. The four subsidiaries thus affected are the *United States Steel Corporation of Delaware*, the *Carnegie-Illinois Steel Corporation*, the *H. C. Frick Coke Company* and the *United States Coal and Coke Company*. Headquarters of the new company will be in a new office being constructed at Pittsburgh, Pennsylvania. President of the company will be Benjamin F. Fairless, now president of U. S. Steel of Delaware. There will be five executive vice presidents: Clifford Hood, now president of Carnegie-Illinois Steel, will be vice president of operations; David F. Austin, commercial; Roger M. Blough, law and secretarial; Malcolm W. Reed, engineering; and George W. Rooney, accounting. Austin, Reed and Rooney are now vice presidents of U. S. Steel of Delaware, and Blough is secretary and general solicitor of that subsidiary.

The U. S. Bureau of Mines has acquired 43 acres of land on the Fort Snelling Government Reservation in Hennepin County, Minnesota, from the Veterans Administration as a site for the new Bureau rock core library. About 1,500,000

feet of cores eventually can be stored in the new library. Repeated studying and analysis of core is a fundamental part of the search for new iron, copper, lead, zinc and other mineral deposits.

On December 27th, the *Oliver Iron Mining Company* loaded 135 railroad cars at the *Monroe* pit with iron ore treated with calcium chloride to prevent or lessen freezing. The shipment, to eastern steel mills, was an experimental one to test the car steaming and thawing equipment recently installed at U. S. Steel mills in the Chicago (which will receive 50 cars), Pittsburgh (50 cars) and Youngstown (35 cars) areas. If the tests are successful all-rail ore shipments may possibly be continued through the winter and may total 400 cars per day. The company had ceased its all-rail shipments, begun in July, during the last week of November when cold weather made the frozen ore difficult to unload at its eastern mills. The all-rail shipments at that time totalled almost 1,500,000 tons and had been necessary because of the late opening of navigation on the Great Lakes.

The *M. A. Hanna Company* estimates that about 14,500,000 cubic yards of overburden will be removed before the 1951 ore season begins. Mines that will be active in stripping work this winter include: the *Morton* (where a 6½ cu. yd. shovel is being set up and two new 34-ton trucks have been put into service); the *Buckeye* (where seven new 34-ton trucks have been added); the *South Agnew; Perry; Argonne; Section 18; Mississippi* group; *Galbraith; Harrison; Cuyuna* group; *Douglas; Weggum* and *Spring Valley*. The company also plans to do a large amount of construction: a new washing plant at the Douglas; a fine ore plant at the *Patrick;* and a Dutch States Mines' Cyclone pilot mill at the Buckeye.

The *Jackson Iron & Steel Company's Bradley* mine at Iron Mountain shipped 32,618 tons of ore during the 1950 season as compared with 14,000 tons in 1949. The mine was operated by *Edward C. Bradley & Sons* of Iron Mountain.

All-rail ore shipments are leaving the *Champion* mine in Michigan of the *North Range Mining Company* for Pittsburgh and South Chicago and may continue all through the winter.

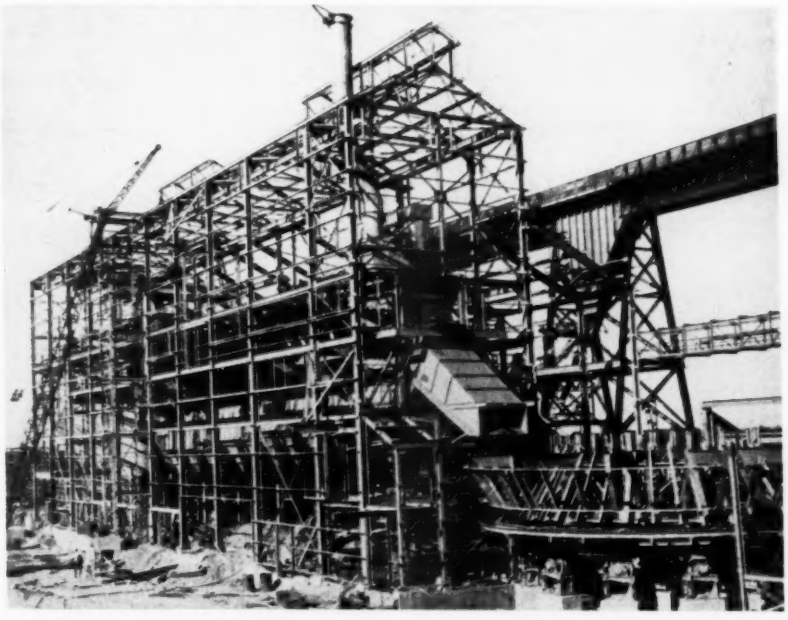
M. A. Hanna Company will continue underground mining at its Michigan mines for stock-piling during the winter anticipating an active demand in 1951. At the *Wauseca* mine a large modern dry-house is being constructed and the dry-house at the *Hiawatha No. 1* has been dismantled for transfer to the *Hiawatha No. 2* shaft. Dewatering is under way at the *Tully* mine and two winzes are being sunk from the 10th level of the Homer.

The importance of an adequate water supply for taconite concentration plants was emphasized by E. V. Willard, St. Paul, Minnesota, state deputy conservation commissioner. In a recent talk on Minnesota water resources he said that to pipe water into the taconite processing area from distant streams, perhaps even the Mississippi River, might be necessary.

The *Castile Mining Company* has suspended operations at its *Eureka* mine at Ramsey, Michigan, on the Gogebic range. The property has been operated by *Oglebay, Norton & Company. Pickands Mather & Company* has taken over the Eureka shaft for the *Youngstown Mine Company* and will use it as an outlet for removing ore from an adjoining property. The Eureka had produced since 1905 and a depth of 3,591 feet had been attained. A recent drilling program failed to locate new orebodies.

The *Cleveland Cliffs Company* has set up one of the best equipped mine rescue stations in existence anywhere at its Mather "B" mine. The facilities, which will be available for other mine operations on the Marquette range of Michigan, include a smoke tunnel where rescue crews may receive training under real fire conditions. All equipment is of the latest design and is complete in every detail. The company has 153 men who have been trained in mine rescue work.

OLIVER BUILDS NEW AGGLOMERATING PLANT



The Oliver Iron Mining Company's new sintering and agglomerating plant for fine ores and taconite is going up rapidly beside the Rouchleau crushing plant at Virginia, Minnesota. The plant is a major step in the U. S. Steel mining subsidiary's $20,000,000 taconite-beneficiation research program and is being constructed by the McKee Company. At right front is shown the circular cooler for the agglomerated ore product. When the plant is finished it will be run on a 24-hour daily schedule and will be capable of producing 1,000,000 tons of sinter and nodules per year. About 50,000 tons of coke, 35,000 tons of coal and 35,000 tons of limestone annually will be needed to produce a finished product.

precipitates—ROCKY MOUNTAIN

American Smelting to Operate Keystone Mine

D. J. Pope, general manager, Western Mining Dept. of the American Smelting & Refining Company has announced that, pursuant to an agreement between his company and the Park City Consolidated Mines Company, the operating management of Park City's Keystone mine, Gunnison County, Colorado, has been taken over by ASARCO.

Exploration and development work at the mine will be continued this winter under the supervision of Nolan Probst, formerly with the Park City company, who will remain as superintendent under the new management. A new adit has been started 300 feet above the lowermost of the two adits on the property. During the summers of 1949 and 1950, Park City Consolidated advanced the lower adit northwest to a total length of about 2,000 feet from the portal. Two zinc-lead-copper-silver oreshoots were disclosed in this drifting.

The *United States Vanadium Corporation*, long known to miners throughout the western states as "USV," is no more. The name of the corporation has been changed to *Electro Metallurgical Division, Mining Department, Union Carbide and Carbon Corporation*. The Uravan, Rifle and Grand Junction, Colorado, operations of the old corporation will not be changed, according to an announcement by John W. Hill, general superintendent, Grand Junction. The Mining Department of the Electro Metallurgical Division has plans for mill expansion and improvements at its 250-ton-per-day Uravan plant, which salt roasts and carbonate-leaches uranium-vanadium ore, and at the similar 200-ton-per-day Rifle plant. Cost of these changes is estimated at $350,000. J. F. Brenton is Rifle plant superintendent and J. E. Hopkins, Jr., is Uravan plant superintendent.

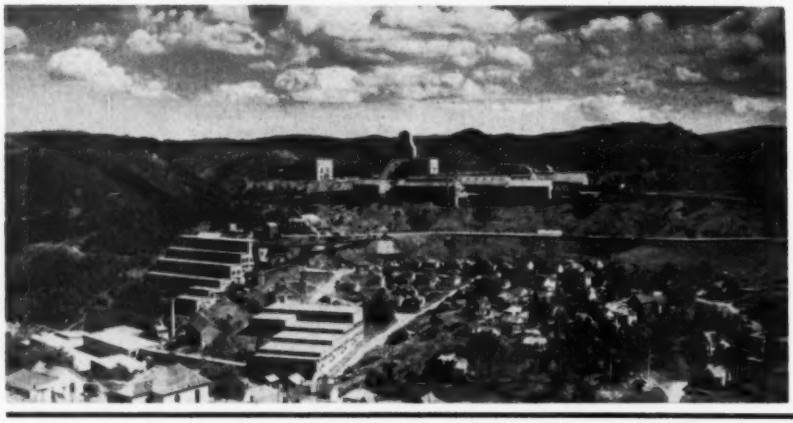
The uranium-copper mill of the *Vanadium Corporation of America* at Hite, San Juan County, Colorado, is now operating on a three-shift-per-day basis with a crew of 36 men. A new plant to recover copper from the uranium tailing has been completed and placed in operation. The company plans to operate the mill all winter as a new road has been built to the mill and has lessened the difficulties of winter transportation. Leroy Parker of White Canyon is mill superintendent.

Eighty tons of ore from the *Sunnyside* mine at Eureka, Colorado, of the *United States Smelting, Refining & Mining Company* have been shipped from Silverton to Salt Lake City, Utah. The lead-zinc-gold-copper-silver ore occurs in a rhodonite ($MnSiO_3$) gangue and is known as "Sunnyside Pink" because of its color. Experiments will be made in Salt Lake City by the U. S. Bureau of Mines to try to develop a commercial method of recovering the manganese in the ore. In the event a successful method is developed, a large potential manganese output would be available since the Sunnyside vein has measured up to 50 feet wide in places and the vein is strong in the lowermost mine workings. In addition to rhodonite other manganese-silicate minerals in the ore are tephroite, alleghanyite, helvite and friedelite.

K. N. Garard and associates are diamond drilling a large mineralized area on their mining claims in Ouray county, Colorado. The claims recently were acquired by the group, and initial drilling is reported to have disclosed gold-silver mineralization. Extensive development is planned.

The *Rocky Mountain Diamond Drilling Company* is making regular shipments of lead-zinc ore from leased claims in Mineral Park, Park

HOMESTAKE, NATION'S LARGEST GOLD MINE, REMODELS CRUSHING PLANTS



The Homestake Mining Company, Lead, South Dakota, is reconstructing its crushing plants to provide a third stage of crushing. In the present plants, crushing is in two stages with 18-inch opening gyratories followed by 7-foot standard Symons cone crushers. The 1½-inch product goes to stamps in the mill. In the revamped crushing plants, primary crushing will be in 30-inch-opening, modern, Allis-Chalmers gyratory crushers followed by 7-foot Symons standard and 7-foot Symons short head crushers, both in closed circuit with screens. The new crushing plants will produce a minus-½-inch product which will go to the grinding section of the mill from which stamps have been eliminated. The reconstruction of the crushing plant at the Yates Shaft is well under way, and when work there is completed, similar changes will be made at the Ross Shaft crushing plant.

county, Colorado. The orebodies are found as replacements in limestone and are developed through the *Alma Syndicate* shaft. Wallace Rogers of Alma is directing mining operations.

The *Old Hundred Gold Mining Company* has been milling lead-zinc-silver-gold ore from its *Garry Owen* mine at the *Pride of the West Mines'* mill, Howardsville, San Juan county, Colorado. Ben F. Webster, Jr., Box 448, Silverton, is manager for the Old Hundred company.

Driving the *Leadville Drainage Tunnel* on a cost-plus fixed-fee per foot basis for the *U. S. Bureau of Mines*, the *Utah Construction Company* had advanced 928 feet between August 26 and January 2, making the total length 7,529 feet from the portal. Tunnel size has been reduced to aid in penetrating bad ground; work has been in Sawatch quartzite, Peerless shale, and an unexpected fault which slowed progress for a time. Now, however, the heading is in well-consolidated Sawatch quartzite and should be advanced more rapidly. Flow of water draining into the tunnel has varied from 1,650 to 2,200 gallons per minute. Both two-piece steel sets and framed, Douglas fir sets are used for ground support, according to conditions. Supervisor of the work for Utah Construction is Charles E. Matthews.

The *Mendota* mine at Silver Plume, Clear Creek County, Colorado, is being operated under lease by the *Mendota-Frostburg Mining Company*. Andrew C. Holmes of Idaho Springs is in charge of operations.

Detailed preliminary geologic maps of underground mine workings in 11 zinc-lead mines in the Kokomo district of Summit County, Colorado, have been placed on open file by the U. S. Geological Survey. The maps were prepared by the survey under the co-operative plan with the Colorado Metal Mining Fund.

The *Peerless* mine near Keystone, Pennington county, South Dakota, owned by the *Keystone Feldspar and Chemical Company*, Chicago, Illinois, is being developed by the U. S. Bureau of Mines. Employees of the Bureau are driving an adit on the *Protector* claim as an initial stage to determine the cheapest and most efficient way to mine beryl-bearing pegmatite. Bulk samples of the pegmatite will be taken and shipped to Rapid City where S. M. Runke, Bureau metallurgist, will direct metallurgical test work directed toward the commercial recovery of beryl from the pegmatite.

The Independent Feldspar Producers Association, Custer, South Dakota, has secured a price increase for its members' crude feldspar sold to the Custer and Keystone grinding mills of the *Consolidated Feldspar Corporation*. Harold McLaughlin of Custer is association president B. A. Gira, also of Custer, is secretary and treasurer.

The *Magnolia Lead and Oil Company* is continuing exploration and development of its *John Henry* claims in the Marysvale district of Utah. Autunite mineralization has

Continued on Page 85

JACK RABBIT MINE

Continued from Page 17

When he was too old and feeble to return to the hills, he spent most of his days hanging around the saloons and gambling houses in Phoenix and was recipient of many a free drink in return for showing the few pieces of quartz to the new arrivals.

Evidently the old fellow had not been in the West long enough to learn that Indians, when traveling from one point to another, whether riding or walking, always travel in a straight line if at all possible to do so. By drawing a straight line from the north end of the Superstitions Mountain to the base of Mount Ord, then prospecting on both sides of the line, some lucky prospector or desert rat might find the lost shaft.

When United States soldiers were stationed in the Apache country at Fort McDowell, north of Phoenix, Ariz., two soldiers were deer hunting across the river to the east. They returned with all the rich gold ore that they could carry and reported they had found it scattered along a white quartz ledge north of the Superstitions and south of Mount Ord. The rock they brought back with them produced $1[illegible] worth of gold. Later, they were unable to locate the place, and it is now believed that after their army discharge they drifted back into the country and took up the search. It may be that the skeletons found by the Pima Indians, the day of the jack rabbit chase, were those of the two soldiers, and that they were ambushed by renegade Apaches who were known to have been hiding out in the Superstitions long after old Geronimo and his warriors had been rounded up and placed on reservations.

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MANUFACTURER'S PERSONALS

OSCAR VON SEEGER has been named assistant divisional manager of the export sales department of Caterpillar Tractor Company.

HAROLD K. BECK has been appointed commercial vice-president, in addition to his present post as manager of the Washington office of Worthington Pump and Machinery Corporation.

LEWIS WALTERS has been appointed project engineer of Southwestern Engineering Company.

JOHN E. EHLERT, formerly in the sales department of Euclid Road Machinery Company, has been appointed manager of Service and Parts.

A. R. KELSO has been elected vice-president of Mack Trucks, Inc., and will be in charge of manufacturing and production at all Mack plants. S. S. STEWART has been named vice-president in charge of purchasing for Mack Manufacturing Corp.

ROBERT P. MESSENGER has been elected executive vice-president of International Harvester, and EDWARD M. RYAN has been elected vice-president in charge of foreign operations.

CLAUDE MULLEAGUE has been appointed sales engineer in the Western Division Sales Department of Caterpillar Tractor Company.

MARION H. FREEDMAN has been appointed division vice president of the Pacific Northwest Sales Division of Columbia Steel Company, a U. S. Steel Subsidiary. He will headquarter in Seattle.

WALDO J. MORDINI has assumed the position of sales representative, Western Division of Caterpillar Tractor Company, with headquarters in San Leandro.

R. D. REDNER has been promoted to sales representative of the Detroit Diesel Engine Division of General Motors for Minnesota, North and South Dakota, Iowa, Nebraska, Western Missouri and Kansas.

EDWARD DALEY has been appointed assistant regional manager of the Southwest territory for the Cummins Engine Company. His office will be in Los Angeles.

WILLIAM F. WILLIAMS has been appointed vice president, Manganese Sales, of Taylor-Wharton Iron & Steel Company. Other company appointments include H. E. CRAGIN, JR., assistant vice president and JOHN P. REYNOLDS, assistant sales manager.

Arizona Laboratory Moves and Expands

Arizona Testing Laboratories, chemists and engineers of Phoenix, Arizona, have moved to a new location at 817 W. Madison Street. Claude E. McLean, announcing the recent move says, "We have more than doubled the floor space over our former location and are much better arranged to care for our clients."

Continued from Page 81

been found in a short tunnel and in an open cut according to Ken Griffith, secretary-treasurer.

Development headings in mines of the *Vanadium Corporation of America* at Marysvale, Utah, are reported to show uranium values, and an improved grade of ore at depth is being developed, according to D. W. Viles, vice president in charge of mining for the corporation.

The *Spider Uranium Mining Company, Inc.*, has been formed in Idaho to develop uranium claims near Calleo, Utah. J. W. McAffee of Arimo, Idaho, and H. P. Bertelsen of Marysvale, Utah, had been prospecting and exploring in the Calleo area for the last six months and uranium mineralization was first discovered by Bertelsen, using a Geiger counter. In addition to McAffee, two Pocatello, Idaho, men, Freeman L. Thomas and O. F. Baur, are interested in the new company.

The *Boyles Brothers Drilling Company* of Salt Lake City has been awarded an $83,860 contract for drilling 10,700 feet of core and non-core diamond-drill holes in the Maryvale, Utah, uranium district. The contract was awarded by the *U. S. Atomic Energy Commission* which will supervise the drilling on mining claims in the district under existing agreements with claim owners. The holes will be drilled to an average depth of about 500 feet and some may go to a depth of 1,000 feet. Three surface drilling rigs and a crew of 15 men started drilling in January, according to R. T. Goldsworthy, assistant manager of the company.

An inclined shaft is being sunk by Kenneth Snow to explore uranium showings in the Mesa Verde sandstone on leased property seven miles east of Jensen, Uintah County, Utah. The Mesa Verde sandstone has not been a host rock to uranium ore to date on the Colorado Plateau, nor has uranium been mined in Uintah County before, but Snow reportedly has found pockets of uranium-bearing material assaying in excess of 0.05 percent U_3O_8.

At Park City, Utah, crosscutting by *Park Utah Consolidated Mines Company* in the Crescent fissure area is being pushed following completion of a 90-foot-long section of double-tracked crosscut to speed switching of cars to the mucking machine in the heading. About 375 feet of crosscut has been driven under the participating agreement with *Silver King Coalition Mines Company*. Paul Hunt, vice president and general manager of Park Utah, has reported that the course of the crosscut will be changed so as to intersect the fissure at right angles to its projected strike. Present plans include the driving of a 100-foot raise to explore the fissure.

W. T. PURVANCE, native of Provo, Utah, has been promoted from construction engineer to assistant chief engineer of Geneva Steel Company and Columbia Iron Mining Company in Utah, both subsidiaries of United States Steel Corporation. He attended Brigham Young University at Provo, majoring in geology, served as resident bridge engineer for the Utah State Highway Commission and joined the steel company in 1942 as field engineer during the construction of the Geneva plant.

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1—#7 American "Sirrocco" Exhauster
1—#80 Acme Type "AE" Material-Handling Blower
3—#250 D.F.C. Furnace Blowers
1—North American 825 CFM Furnace Blower driven by 7½ HP motor
1—#6 Buffalo Steel Pressure Blowers, turbine driven
2—#10 Buffalo Pressure Blowers
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1—6½"x22¾" Roots Rotary Positive Pressure Blower
1—8½"x29¾" Roots Rotary Positive Pressure Blower
1—10"x18" Sutorbilt New Rotary Positive Pressure Blower
1—24"x78" Roots #7 Rotary Positive Pressure Blower
1—#50 American Steel Plate Blower
1—#60 American "Sirrocco" Steel Plate Exhauster
1—#6 Sturtevant Volume Blower
1—#250 Type SM Coppus-Vano Blower driven by 3-hp. motor
1—#4 Type T Coppus "Ventair" Blower
1—#8 Buffalo Volume Blower
4—#21 Type F. U. S. Volume Blowers
4—#24-SR Mueller New Volume Blowers
15—Type HS New American Volume Blowers, 12,000 CFM driven by 12½-hp. motors

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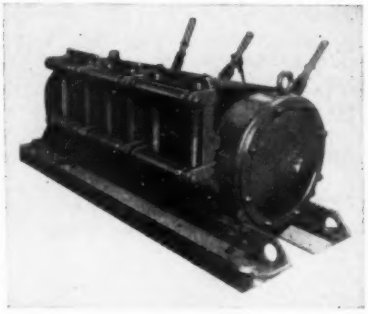
1—48"x18' Dorr Duplex Classifier
3—"St. Joe" Type Hydraulic 10-Cell Classifiers

JAW CRUSHERS

2—8"x8" Universal #2
1—8"x24" Rogers, cast steel



1—8"x36" Universal, all steel
1—15"x28" Pacific, all steel
1—9"x15" Farrell Blake
1—9"x36" Cedar Rapids
1—13"x24" Telsmith

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1—1" Wilfley sand pump
4—2" Wilfley sand pumps
1—2" Denver vertical sand pump
1—3"x3" Allen-Sherman-Hoff "Hydro-Seal" rubber lined
1—3" Telluride sand pump
2—4" Wilfley sand pumps
1—4"x4" Allen-Sherman-Hoff "Hydro-Seal"
1—4" Denver vertical sand pump
2—6" Wilfley sand pumps

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1—1½-ton Mancha "Little Trammer" Battery Locomotive
2—2 to 2½-ton Mancha Battery Locomotives, 18" gauge
1—2½-ton Whitcomb Battery Locomotive, 24" gauge
2—5-ton Westinghouse Battery Locomotives, 24" - 36" gauge
2—7-ton General Electric Battery Locomotives, 36" gauge
2—8-ton General Electric Battery Locomotives, 36" gauge
4—10-ton Atlas Battery Locomotives, 36" gauge
1—3-ton Ruth Gasoline Locomotive, 18" gauge
1—3-ton Whitcomb Gasoline Locomotive, 24" gauge
3—6½-ton General Electric Trolley Locomotives, 36" gauge
1—6 ton Goodman Trolley Locomotive

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2—Gardner-Denver Model HB air tugger
1—Ingersoll-Rand, size EU, air tugger
1—Ingersoll-Rand, Model 6HC, air tugger
1—Ingersoll-Rand, 2 drum, size 5NH-OH electric tugger
2—Sullivan, class RH electric tuggers
1—Ingersoll-Rand, size 107, electric tugger
1—Sullivan, Model B-211, 2 drum, electric tugger
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3—7½ HP Sullivan electric tuggers
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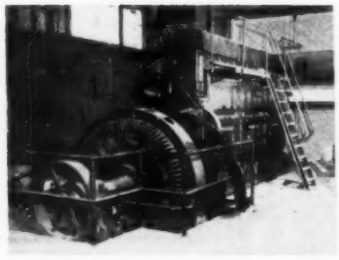

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24"	4	1/8"	1/32"
24"	5	1/8"	1/32"
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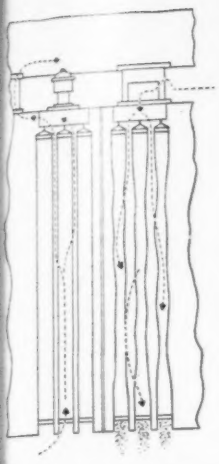
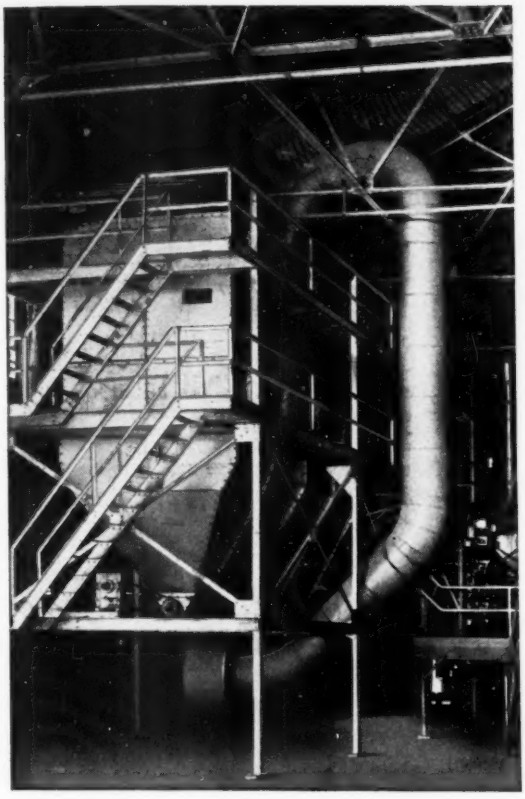
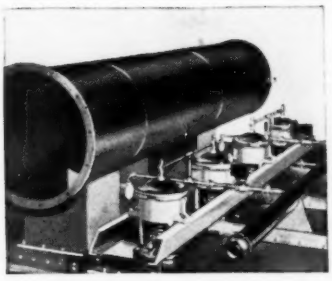


Shown above dust laden air moving upward, distending bags. Right half of cut shows reversed air current as bags are shaken and cleaned. At right the exterior of entire unit.





Close-up of automatic shaker units and an air reversal valve. Norblo bag shaking involves only one compartment at a time for only 10 seconds. Timing cycle is variable for dust loading, without shutting down.

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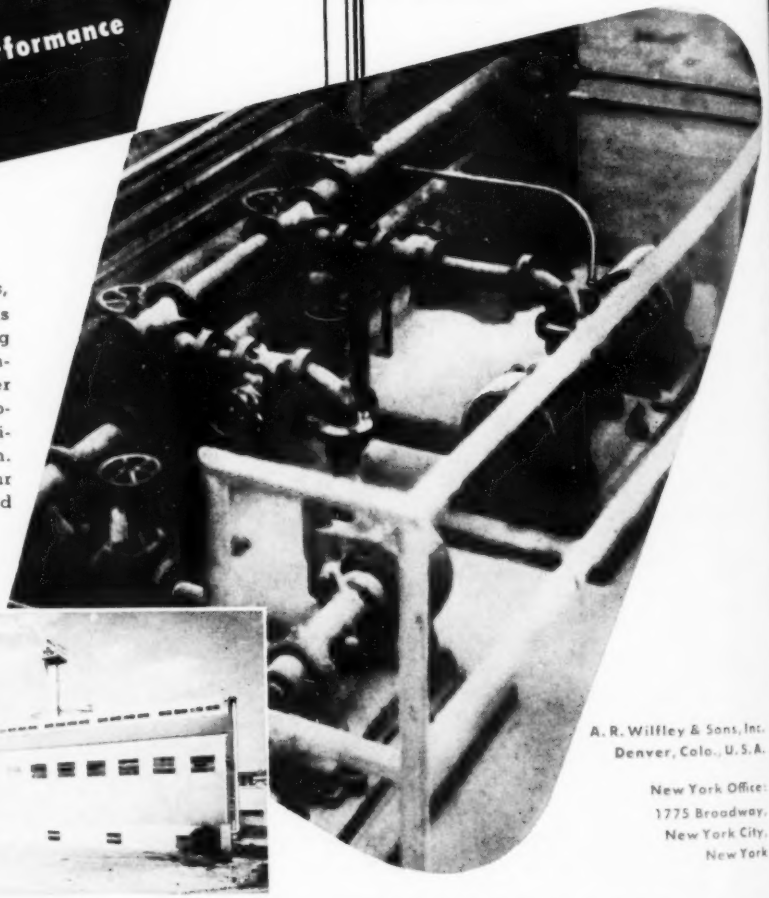

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